MARCH 1961
In Two Sections
Section I

ie

ILLUMINATING ENGINEERING

Journal of the
ILLUMINATING ENGINEERING SOCIETY

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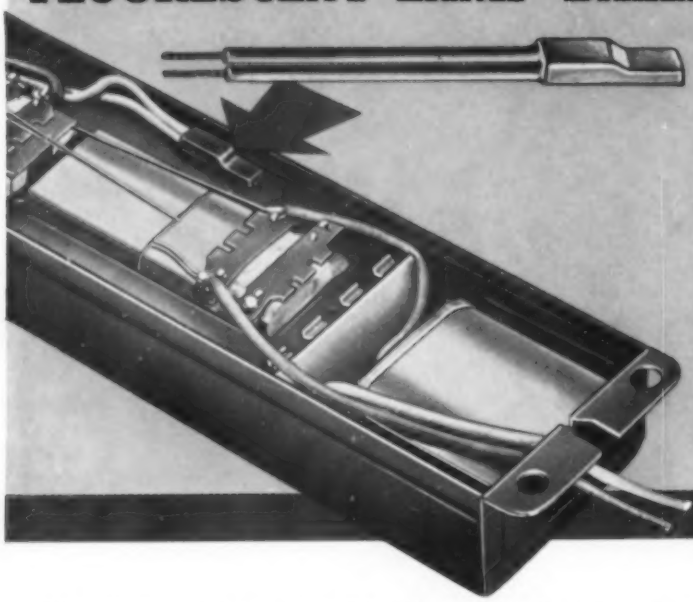

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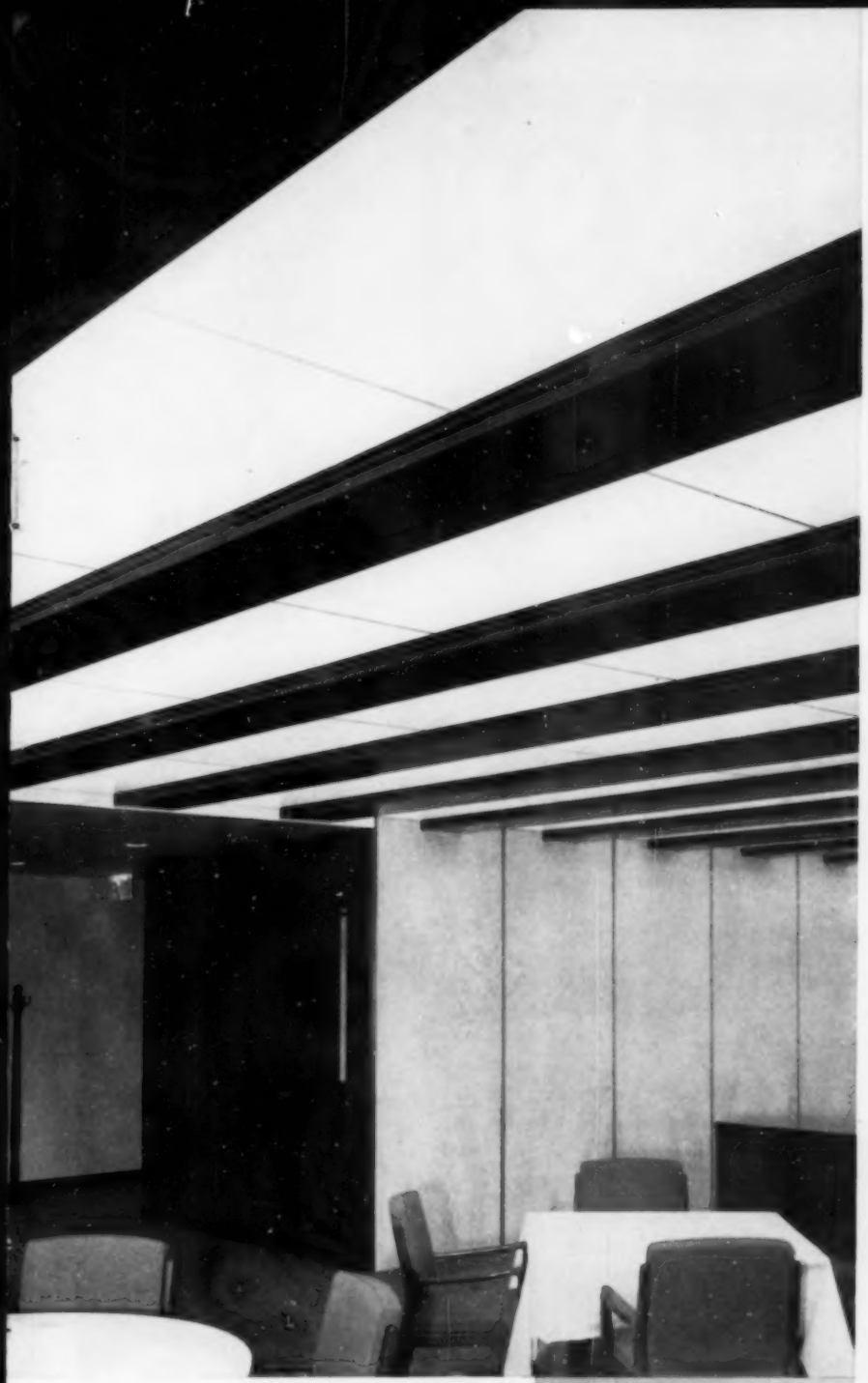

The Plaza Building of Prudential Life Insurance Company of America, 736 Broad Street, Newark, New Jersey. Architects: Voorhees Walker Smith Smith & Haines, N. Y. Interior Architectural Designers for area shown: Maria Bergson Associates, New York, N. Y. Installation: Beach Electric Co., Inc., and Lightning Electric Service Company, East Orange, N. J.

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ILLUMINATING ENGINEERING

THE JOURNAL OF THE ILLUMINATING ENGINEERING SOCIETY

March
1961

Vol. LVI, No. 3
In Two Sections
Section I

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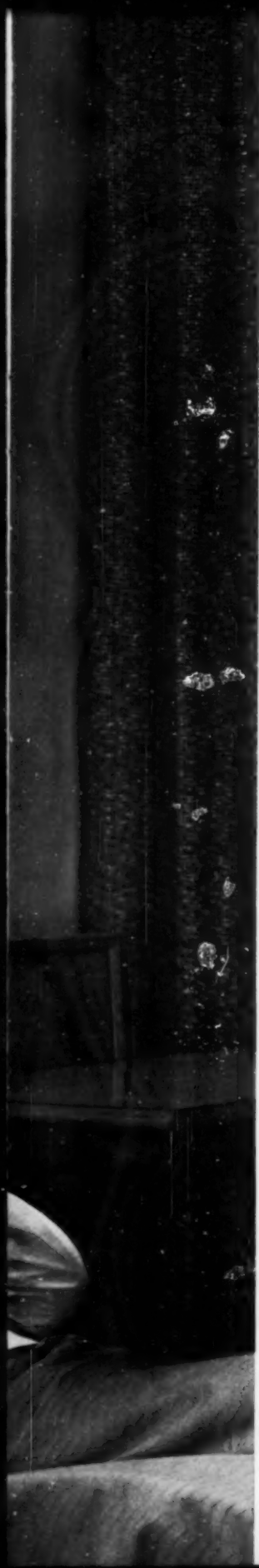
ILLUMINATING ENGINEERING SOCIETY

EDITORIAL and ADVERTISING offices
1860 Broadway, New York 23, N. Y.

PUBLICATION office 32d Street & Elm Avenue, Baltimore 11, Md.

Founded 1906

ILLUMINATING ENGINEERING: The Journal of the Illuminating Engineering Society. Copyright 1961 by the Illuminating Engineering Society. Published monthly in the United States of America. Entered as second-class matter at the Post Office, Baltimore, Md. Acceptance for mailing at special postage rates provided for in Section 1103 P.L.&R., Act of October 3, 1917. Authorized July 16, 1918. ¶ Subscription $18 per year plus extra postage to all countries to which second-class postage rates do not apply; single copies $1.50. ¶ Address changes must be received at I.E.S headquarters by the first of the month to be effective with the issue of the next succeeding month.



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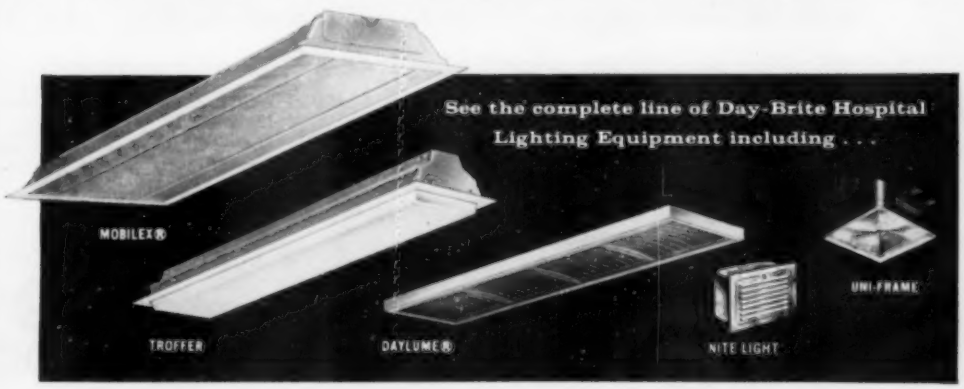
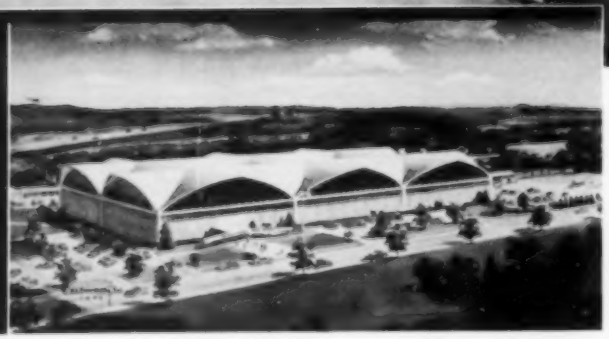


Experimental Automatic Post Office Gets PROVED-IN-SERVICE Lighting with Standard Fixtures



The ceiling fixtures in the lobby of this history-making edifice came right out of our new Litecontrol catalog. The "special" character of this equipment is that it delivers high intensity illumination without glare at a *budget-controlling, in-stock cost*. Your money can't buy better. Yes, and as you can see, these fixtures are handsome too . . . they blend beautifully into this modern interior.

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Section I—March 1961 IE

As outlined also on page 149 (Section II), this issue of Illuminating Engineering is published in two sections. This innovation has been introduced by the Publications Committee as part of its program to serve more members more effectively. For the present it is the plan to publish just one two-section issue of IE — this current (March) issue—with subsequent issues to be in one part as usual.

Section II of March IE publishes "at one fell swoop" fourteen of the 1960 National Technical Conference papers, together with their discussions. This affords earlier publication of this valuable reference material than would otherwise be possible. An additional purpose of this plan is to open up space in subsequent issues for more pages of current practical material on the application aspects of lighting.

In addition to reporting details of outstanding installations, solutions to current lighting problems and other matters of daily interest to lighting practitioners and architects, IE will seek and publish articles on numerous other subjects currently helpful to these readers. An exhaustive garnering is planned, for example, of all of the information a lighting man may need on the subject of the coordination of lighting, heating and air conditioning; a review of existing glare data; a study of the school lighting situation—and many others.

Readers are invited to suggest subjects which they would find helpful as articles in IE—and the editorial office will "turn heaven and earth" to get the material. In addition, members are invited, of course, to participate in this constructive publications program as authors of such articles.

THE UBIQUITOUS

ALC entry by Raymond Tobias, Ohio Valley Section

Unsightly ceiling in an old loft building was blacked out with a coat of paint and coffers with 150-watt A23 lamps suspended from the ceiling to provide wall washing illumination on the paintings in this art gallery.

TOO HIGH, too low, cluttered, unsightly, not level—all are epithets for the ceiling, the beginning of most lighting problems. The catalog of ceiling maladies is long and since there is no panacea, the successful solution of some particular ceiling problem is always of interest. Although the installations discussed here by no means cover the vast range of possible ceiling complications, they are a sampling of effective solutions to some frequently encountered problems. To give problems their proper bouquet—their presence almost always results in an installation which is more effective than one which could have been engendered by an "ideal" area.

CONCEALING UNSIGHTLY CEILINGS

Most familiar, perhaps, of all troublesome ceilings is the one in the old loft building, replete with beams, pipes, valves, sprinkler heads, etc. For converting an area of this vintage into modern office, store or similar space, one popular lighting technique is a luminous ceiling. This covers all iniquities and provides good lighting as well. What happens, though, when the loft building is to become an art gallery—surely no place for a luminous ceiling!

The successful solution to this particular problem was begun with a coat of flat black paint over the ceiling and all its appurtenances. Next, wooden coffers were prefabricated and dropped from the blacked out ceiling to a point eight feet from the floor, parallel with the tops of the newly-installed display walls. Coffers were located so that recessed fixtures would be at a point two feet from the walls they were lighting.

Recessed in the troffers, adjustable wall washing units with 150-watt A23 lamps, one diffuse and two specular Alzak reflectors, produce a controlled pattern of vertical illumination over the wall surfaces, with a minimum of 30 footcandles on the focal points of the paintings. Coffers and fixture trims were painted black to recede into the background; lighting units installed in 360-degree rotating apertures to permit flexibility for future displays. To supplement the wall washing units, electrified "trolley duct" was installed on the ceiling throughout the gallery and fitted with ad-

CEILING

ALC entry by J. E. Needham, Cleveland Section

Luminous ceiling gains distinctiveness by the introduction of a random pattern of colored diffusing panels.

ALC entry by E. H. Unruh, Northwestern Ohio Section

Modern design of Grace Lutheran Church in Toledo inspired interesting cove lighting design for the nave.

justable bullet units. These house 150-watt R40 lamps for highlighting statuary, art objects and the collection of antique furniture.

MONOTONY OF LUMINOUS CEILINGS

The visual monotony of a large expanse of luminous ceiling has often proved detrimental to this otherwise very effective lighting technique. A 1957 paper by Clark and Harz developed the idea of adding interest to luminous ceilings by the introduction of colored panels and baffles. Periodic rearrangement of ceiling patterns was reported to be psychologically beneficial in creating a more stimulating working environment. A 1959 paper by Kepes, Preusser, Spencer and Martin (July, 1959 IE, page 443) discussed further possibilities for the "enrichment of luminous ceilings" through variations in texture and form.

Responding to the need delineated in these papers and to exhortations from both architects and clients, lighting engineers are designing luminous ceiling systems which deal with this problem. Among the most economical means for alleviating monotony and individualizing a luminous ceiling are colored panels. In the Cleveland coffee shop pictured at left above, random placement of red and orange diffusing panels has added distinction to an otherwise routine installation. The engineering design of the ceiling, producing 150 footcandles, consists of four-foot rapid-start fluorescent lamps mounted on 14-inch centers above one-quarter-inch, white, opaque, acrylic plastic panels. The ceiling design repeated outside the store creates an interesting marquee effect over the entrance, making the restaurant even more attractive to passers-by.

LIGHTING PROBLEMS WITH MODERN ARCHITECTURE

Inviolable Architectural Design

Subordination of lighting to the totality of the architectural design, particularly in new buildings, is an all too familiar problem. In public buildings especially, the lighting designer is frequently warned not to interfere with the design of the ceiling line. Where structural considerations make recessed lighting impossible, the application of a

Cove lighting using three-lamp industrial units with ten per cent upward component provides 35 footcandles on pews without marring beautiful sloping ceiling. Upward component of fixtures is used for aisle lighting.

little engineering imagination can circumvent this problem.

The interesting cove lighting design for Grace Lutheran Church, Toledo, Ohio, developed from the presence of a steep sloping roof which could not be marred by suspended equipment nor used for recessed downlights. By extending the false ceiling installed above the side aisles for concealment of air conditioning ducts, the lighting designer was able to create coves along both sides of the church nave.

Since the light reflected from the sloping, natural wood roof was to be the only source of illumination on the pews, a source of high lumen output was mandatory. Three-lamp 40-watt rapid-start industrial fixtures with 10 per cent upward component were installed in 12-foot rows between the laminated arches along the entire length of the nave. Mounting angle, to eliminate hot spots and provide the best possible light distribution, was determined by projecting the candlepower distribution curve onto a cross section elevation of the nave. With mounting angles determined, cove support members could be precut and the lighting units automatically positioned.

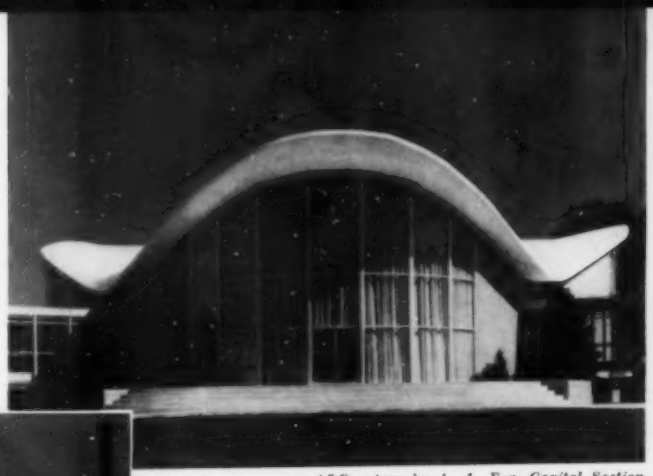
To minimize shadows from the roof purlins, 150-watt reflector floods were installed at the ends of each of the 12-foot rows of luminaires. This minimized the original shadows, but had the unexpected effect of creating additional shadows on the underside of the purlins, despite the fact that the lower purlin faces were well-lighted.

The *upward* component of the industrial fixtures is used for lighting the side aisles where the presence of air ducts again prevented the use of recessed equipment. The aisle ceiling was placed above supporting members and cove enclosures on the underside of these supports, leaving openings through which light is directed on the aisles.

Lighting is circuited to provide four levels of illumination (varying from 9 to 35 footcandles on the pews) with seven possible combinations of equipment. A decorative touch, supplied by the architect, was the placement of two spots to form a subtle heart-shaped light pattern around the cross.

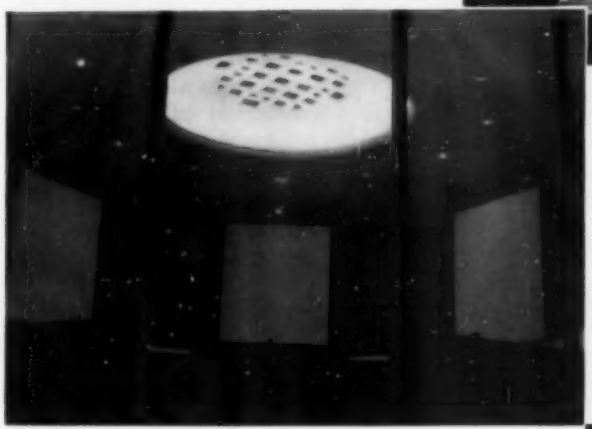
Belated Lighting Consultation

Despite the continued emphasis in both architectural and lighting press (and by many architects and engineers) on the need for coordination of lighting and architecture from the drawing board stage, the cases where the lighting designer is called to a job after construction has begun are



"Tri-cornered hat" design of Atlantic Research Corp. building in Alexandria, Va., resulted in an uneven sloping ceiling, complicating a recessed lighting design. Pre-wired housings were installed in the ceiling during construction, then stove pipes inserted, and cut to conform to actual ceiling slopes after construction was completed.

ALC entry by A. A. Fox, Capital Section



Cold cathode warmtone lamps in a cove are combined with recessed floods and wall washing units in the rotunda of the Atlantic Research Corp. building. Separate wiring of the three lighting elements permits variation of illumination effects.

disturbingly frequent. The outside walls and roof framing of the Atlantic Research Corp. building in Alexandria, Va., were already in existence when the lighting designer was brought to work and required to provide *equipment* within 24 hours—to meet the contractor's schedule for the installation of the wire mesh for the acoustic plaster ceiling.

The tri-cornered hat design of the building involved a sloping ceiling, the precise slope of which could not be determined until construction was completed. To obviate the problem of protruding "recessed" equipment, pre-wired housings for the baffled downlights were installed immediately and "stove pipes" inserted to extend below the final ceiling line. When the actual ceiling slopes were known, stove pipes were cut off at the ceiling line and inner baffles made to conform to the dimensions. Baffles and frames were later installed with tension springs to eliminate the presence of screws or other joining materials.

In the rotunda of the building, central cove lighting from two rows of 35-mm warmtone cold cathode lamps is encircled by 150-watt PAR38 reflector floods in concentric ring baffled downlights and 150-watt R40 wall washing units. The main downlighting in the entrance lobby, where ceiling heights range from 19 to 26 feet, is from PAR38 reflector flood lamps on approximately six-foot centers. Light from the 200-watt PAR46 wall wash-

Illumination from 200-watt PAR46 wall washing units in the lobby, diffused through the draperies, serves to light the entrance stairs, eliminating the need for exterior lanterns. Main downlighting in lobby (not visible) is from PAR38 reflector floods on six-foot centers.

ALC entry by W. S. Greenwood, New Jersey Section

Varied lighting levels and fixture layouts create visual division of low-ceilinged area without cluttered look.

ing units, diffused through the Fiberglas draperies behind the building facade, provides sufficient illumination on the entrance stairs to eliminate the need for exterior lanterns. The nighttime effect of the softly lighted draperies also acts to reinforce the architectural design. Each group of lighting units in both the lobby and the rotunda is wired for separate dimmer control.

LOW CEILINGS

In the design of lighting for low-ceilinged areas, the paramount problem is to provide good light distribution without clutter. Higher lighting levels requiring a considerable amount of equipment further confound the problem. If, in addition, the area is irregularly shaped and the lighting must be designed not only for satisfactory visual conditions but also to sectionalize a multi-purpose area, the task is indeed formidable.

At the Newark business office of the New Jersey Public Service Electric and Gas Co., an irregularly-shaped room with no parallel walls and large (four-foot-square) randomly spaced columns, the arrangement of lighting elements plus the use of different illumination levels successfully conquered this problem. For example, rows of shallow surface-mounted luminaires curved to the right coupled with a luminous element over the cashiers' counters direct traffic toward this busy area in the rear of the office. The rows of fixtures, spaced to avoid the columns, produce about 100 footcandles of general illumination from two- by four-foot units with 40-watt rapid-start cool white lamps and low brightness, clear, prismatic plastic lenses. Metal sides which prevent the light from spilling onto the ceiling make the luminaires less conspicuous, while the light reflected from the floor is sufficient to keep brightness ratios between lenses and adjacent ceiling in the comfortable range.

The luminous element over the cashiers' counters, a continuous expanse of plastic grid louvers, uninterrupted by cross rails, produces about 110 footcandles on the counters and an even wash of light along the back wall. The element is 18 inches deep and has T-rails spaced on 12-foot centers. Forty-watt, four-foot lamps are mounted on 12-inch centers, 14 inches above the one-half-inch-cube plastic louvers, with the end rows six inches from the edge of the ceiling section. An irregular arrangement of fluorescent strips at the left end of the luminous element maintains satisfactory brightness of the louvers at that point.

Highlighting for the appliance display along the north wall of the office is accomplished by two rows of surface-mounted luminaires, arranged six inches apart for pleasing design. The 145-footcandle level delivered, the highest in the room, is a subtle attention-directing device which succeeds in unifying a potentially piecemeal display. Over the customer service desk on the other side of the office, a similar double row of fixtures provides 130 footcandles for office work.

Comfort of the installation is assured by the surface reflectances, walls, 55 per cent; ceiling, 75 per cent; floor, 25 per cent. The appearance of the room is pleasing, with the neat functional arrangement of the lighting elements contributing to the over-all unity of design.

Appliance display stands out under 145 footcandles, highest illumination level in utility's business office area.

LUMINOUS WALLS

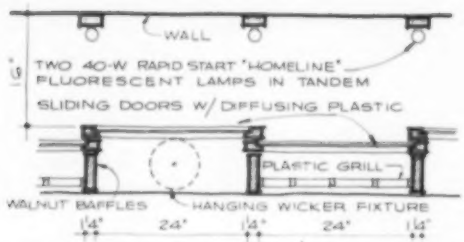
New Decorative Lighting Technique

THE LUMINOUS vertical surface, one of the most imaginative lighting applications to achieve recognition in recent years, shows signs of becoming a major element in both residential and commercial interior design. Although lighted walls may help to improve visual conditions by balancing room brightnesses and may be used, functionally, to simulate daylighting conditions, their essential purpose is, undoubtedly, decorative.

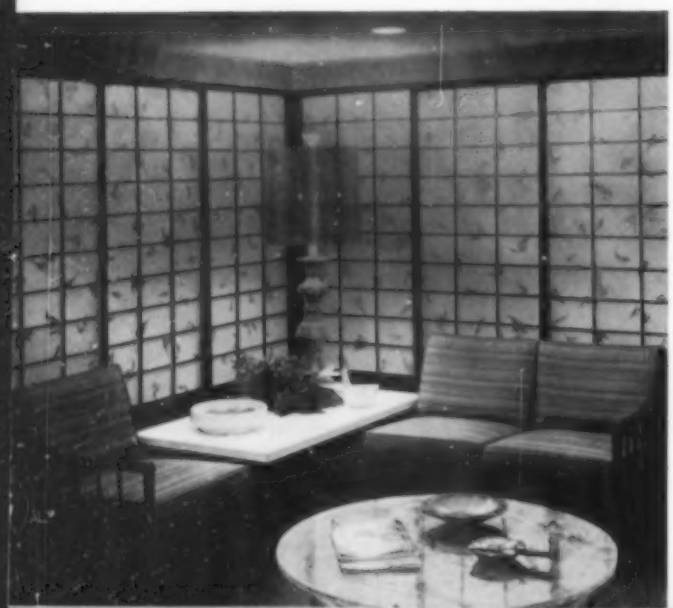
Patterned plastic, glass, metal and wood, decorative grilles and frets have been used by decorators for many years as room dividers or to add interest to walls. Now, lighted from behind, these beautiful materials achieve a new dimension in light, color and form. Switching and dimming arrangements, a variety of lamp colors and the wide range of diffusing materials available provide endless possibilities for decorative and luminous effects.

Color is particularly effective in large expanses of luminous walls. Here, cool white deluxe, daylight and pink fluorescent lamps are combined with a random pattern of blue and green incandescent lamps and each color wired on a separate circuit for mood variations in color and brightness patterns. Plastic diffusing panels mounted in wooden frames glide across a ceiling track for ease of maintenance.

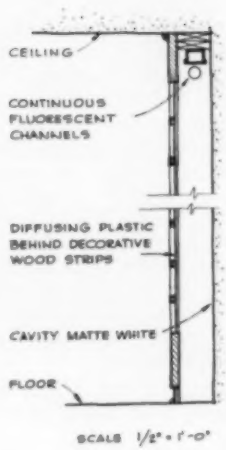
Photos and data courtesy General Electric Co, Cleveland, Ohio.

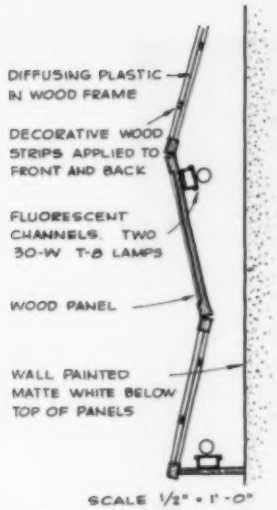


Two varieties of the luminous wall — plain diffusing plastic creating a background for decorative wicker fixtures and interesting plastic grille mounted over diffusing panels — are decorative highlights of Mo and Junior's Restaurant, Cleveland. The luminous elements enrich a windowless wall and, in conjunction with other wall lighting techniques (wash of light on draperies and paintings, not shown) create a feeling of spaciousness in the low-ceilinged room. Diffuse side lighting from the wall elements helps to model facial features and reduce shadows from the downlights. Homeline fluorescent lamps blend well with warm brown and red tones of the decor. Architect and lighting designer, S. M. Mills.

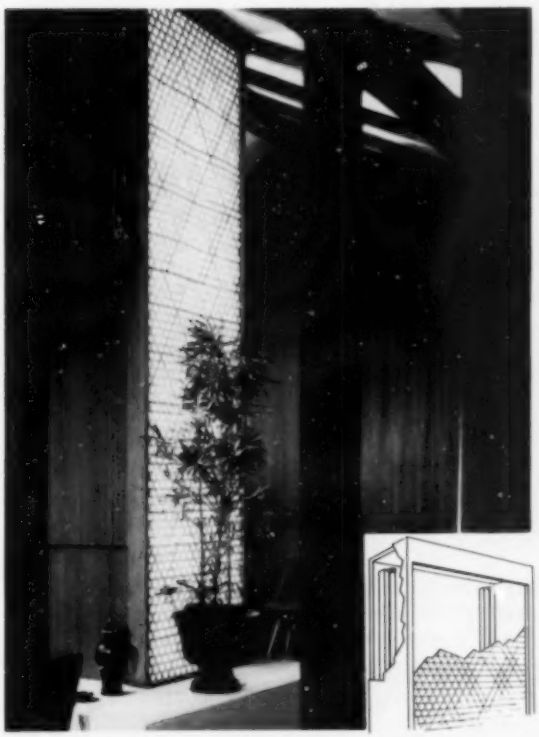


Former coal bin was transformed into an attractive basement recreation room with a luminous wall section used to simulate windows. Lamps are mounted only at the top of the element so that brightness decreases toward the bottom of the "windows," reproducing the effect of natural daylight. Diffusing material is a decorative plastic panel mounted behind wooden strips. Designer, L. J. Byock.

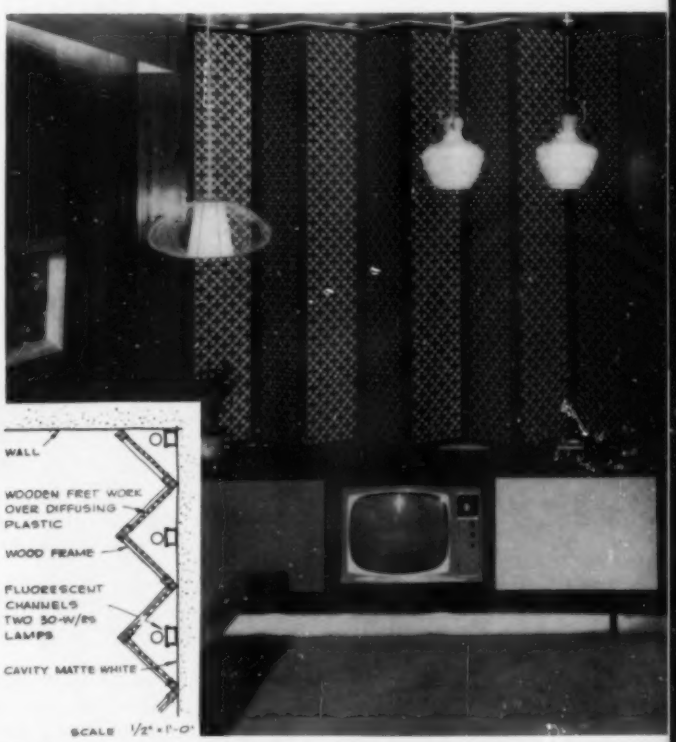



DIFFUSING PLASTIC IN WOOD FRAME
DECORATIVE WOOD STRIPS APPLIED TO FRONT AND BACK
FLUORESCENT CHANNELS. TWO 30-W T-8 LAMPS
WOOD PANEL
WALL PAINTED MATTE WHITE BELOW TOP OF PANELS
SCALE 1/2" = 1'-0"

Another low-ceilinged room, this one aboard the S. S. Constitution, is visually extended by the use of subtly angled sections of luminous screens fastened to the wall behind. The screens occupy very little floor space, yet add a three-dimensional quality to the wall. Cavity is so shallow that lamps are mounted on back of opaque panels and most of the light reflected by matte white wall behind. Strips of wood fastened to front and back of diffusing plastic, wood-framed panels repeat decorative motif of unlighted sections. Designer, Emile Norman.



Decorative high point of this entrance foyer is a column of light forming the background for a potted plant. Diffusing panel of opal plastic with Oriental grass weave overlay hides two rows of 30-watt rapid-start fluorescent lamps which extend the length of the column on two sides of a six-inch-deep cavity. Interior designer, C. Eugene Stephenson; lighting designer, E. W. Commery.



Wooden fretwork mounted over diffusing plastic and lighted from behind is a mood-setting background for suspended decorative fixtures on the wall behind a television/hi-fi unit. Because of the thickness of the frets, the panels may appear to be either opaque or translucent, depending upon the viewing angle, but the light transmission is always uniform. Architect, S. M. Mills.

A.I.A. File No. 31 f

INSTALLATION AT MT. TABOR PRESBYTERIAN CHURCH,
MT. TABOR ROAD, NEW ALBANY, IND.

Lighting a Sign

LIGHTING OBJECTIVE: To black light a church sign to provide an interesting and intriguing sign to attract the passing public and to identify the church.

GENERAL INFORMATION: The three-foot by six-foot sign shown above is mounted six feet above the ground near the road. Gold fluorescent letters are painted on a green background for a pleasing daytime appearance.

INSTALLATION: At night, when the sign is black lighted, the Old English lettering appears off-white against a dark blue background. The letters, which have a brightness of 9 footlamberts, seem almost suspended in air.

The black lighting is provided by a unit shown in section in Fig. 2. It is 49 inches long and equipped with a stainless steel reflector, a Kokomo Opalescent Glass Co. No. 600 Dark Purple Black Light filter glass and two F40T12/BL 40-watt, 48-inch black light lamps. The unit is mounted on a concrete base and is located approximately four feet from the sign.

Due to the dark surrounds at the installation, the sign is legible for a distance of approximately 500 feet.

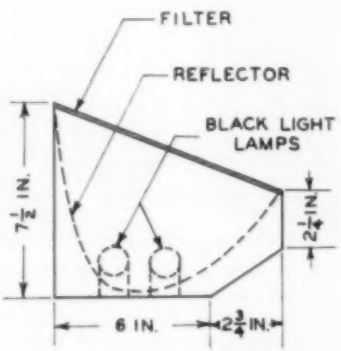


Figure 2. Cross section of black light luminaire.

Lighting designed by Henry Ramsier, Manager of Building Maintenance, and Ronald K. Sparkman, Lighting Representative, both of the Public Service Co. of Indiana, Clarksville, Ind.

Lighting data submitted by R. K. Sparkman and William H. Smith, Electrical Equipment Co., Indianapolis, Ind., as a solution to a lighting problem and to aid in the design of similar installations.

Published by the Committee on Publications of the Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y. This is one of 24 different sheets in Series XXV. Subscriptions to the entire series may be purchased from the Publications Office, IES Headquarters, or quantities of individual sheets, minimum 100, may be ordered.

A.I.A. File No. 31 f

Grantmoor Golf Complex

This is the first report to appear in Illuminating Engineering on an installation for a nine-hole par-3 golf course, the newest problem to confront the outdoor lighting engineer.

Growing up all around us is what amounts to almost a completely new outdoor sport—nine-hole, par-3 golf. According to *Changing Times*, the Kiplinger magazine, the spread of these short par-3 (sometimes par-4) courses now extends to some 300 doing business all across the country.

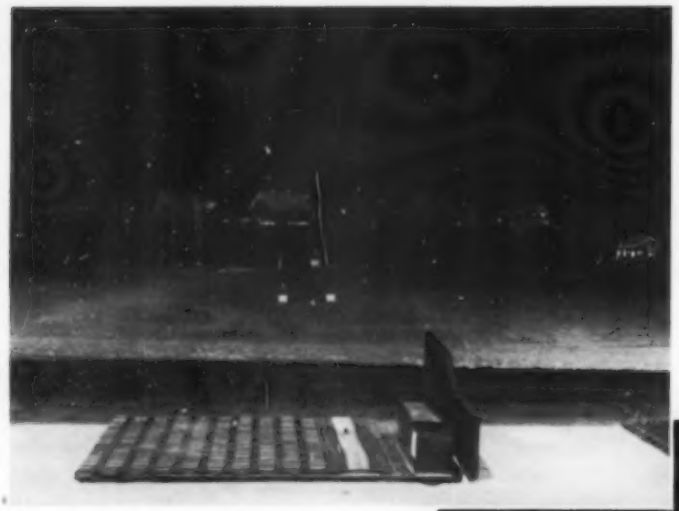
Most often, moreover, this game is played at night. Local lighting engineers are beginning to be faced with the outdoor lighting problems special to illuminating an entire golf course, however short. For a general lighting layout method (unofficial) for short-hole courses, see page 129.

One of the finest examples of the newly-popular nine-hole, par-3 golf courses is the installation at Grantmoor Course in Newington, Conn. Fully illuminated for night play, it attracts hundreds of busy day-workers and whole families as well. The entire complex of 198 acres includes a full-scale nine-hole golf course, miniature course, driving range, a 97-unit motel, restaurant and lounge. In the wind for future installation is an extensive ice-skating rink.

All of these areas are lighted for the nighttime use of visitors. An entire weekend or vacation may be enjoyed here, with no further use of the family car. Transient parking is also available, however, in the large lighted parking lot, for the hundreds of evening golfers.

Developments in color of light, in lamp output and especially in floodlighting equipment to give satisfactory beam distribution are some of the factors making it possible. At Grantmoor, 1000-watt improved-color mercury lamps are used in wide distribution equipment. These are mounted in clusters varying from two to a pole up to a maximum of six to a pole, depending upon the layout required for a particular hole. The poles were already installed for a planned layout to use incandescent lamps; when installation was made using mercury and wide-distribution floodlighting equipment, this equipment was adapted to these existing poles, the number of units varying with the location. Depending upon the location of the pole, mounting height is generally 35 to 40 feet above grade. Footcandle levels obtained from this layout: a variation of three to five footcandles on the vertical surface of the ball in flight along the fairways, which range in length from 60 to 140 yards; ten footcandles on the greens.

Note how clearly the golf balls can be seen on this night-lighted green. 10000-watt improved-color mercury lamps are used in wide-distribution floodlights, two to a pole. Lighting here is from overlapping pattern of two poles; illumination is 10 footcandles.



View of the driving range from tee area. Improved-color and clear mercury 1000-watt lamps were combined to provide additional punch down the range.

Side view of driving range showing combined clear mercury and improved-color mercury (1000-watt) installation.

An interesting problem in illuminating engineering is involved in the layout of poles and equipment for short-course golf. Beam patterns must place the light in the proper direction for play, avoid glare and minimize distracting shadow. Note that the white golf balls may be seen even on the reduced photograph of the night-lighted green (preceding page). At this point the light is from the overlapping patterns of two poles, each having two wide-distribution floodlighting units. Illumination on the green is ten footcandles.

The photo at the top of the page, taken from tee area, shows the entire length of the 300-yard driving range. Since color was not so critical here, 1000-watt improved-color mercury and 1000-watt clear mercury lamps were combined to provide more punch.

Color transition from parking lot to the adjacent course, however, has been carefully maintained. Improved-color 1000-watt mercury lamps are employed, also in wide-distribution equipment, for the parking area. Due to the particular pattern of light distribution obtained only two poles are required to light this area.

A complete change of color pace sets off the miniature golf course. This uses a packaged system featuring incandescent lighting, to provide conventional but warmly-attractive lighting for this sport.

One might fear that large areas of lighted property, such as a nine-hole golf course adjacent to a highway (for at least half a mile), might create glare annoying to motorists. This has been avoided at Grantmoor by careful aiming of the floodlighting equipment. Indeed, the color of the mercury-lighted grass, trees and shrubs—and the contrasting gaiety of the lighting for the sign, restaurant and motel—are a decided attraction in the night landscape.

Data courtesy of Gerald Feldheim, The Jae & Meyer Co., Inc., Mount Vernon, N. Y., for Wide-Lite Corp., Houston. Photos courtesy of Ralph Gould and C. W. McCormick, Connecticut Power & Light Co., Hartford.

Basic Plan For GOLF COURSE LIGHTING

By D. A. TOENJES

LIGHTING designed for golf appeared to be on its way to a great future in the twenties. At one of the IES Conferences in the mid-twenties Gene Sarazen put on a convincing demonstration of the good possibilities of night play. Perhaps the economics of golf course operation, coupled with the problems of duffers to keep on the fairways, have limited the demand for lighting. Other sports have long since turned to lighting to accommodate the public and to solve financial problems.

Golf is primarily for players, not for spectators. The game is not financed by spectator admission fees. Thus, lighting design for fee courses presupposes investment which players will make profitable. Public and commercial links are the obvious markets for the kind of lighting present sources and design make possible today. The growing popularity of the game suggests that in the sixties we shall have the demand that can justify well-lighted night operation at fee courses. Membership clubs, of course, have more ready access to resources for lighting. They too may discover that the night game has a challenge to skill, and a cool comfort its members will want.

Traditions in golf have associated the game with the need for daytime lighting values. Following the flight of a small white sphere is the kind of a thrill that has been associated with thousands of footcandles. Even the excursions into the rough seemed hopeful with daylight to aid discovery of the little ball. After all, a golfer expected to get a good tan even if he couldn't get par.

Other sports have had their strong daytime traditions. But baseball, football, racing and other recreations have found broader service by turning to lighting for night play.

Today, vastly improved sources and equipment presage a period of great development in golf. The discussion of golf course lighting which follows is directed to this very promising possibility.

This lighting design plan, for a typical hole of a golf course, puts light upon each tee, fairway, and green individually, rather than spreading it throughout the general area. In the example we have chosen tees and greens of average size; for a proposed course where these areas are different, the estimated lamp wattage requirements will change accordingly. If the length of hole is within the range of about 250 to 350 yards, then five separate "lighting planes" are included. Three of these planes are horizontal, and two are vertical. This particular plan is designed for a par-4 hole that is 350 yards long, but other lengths can be covered by similar techniques, as outlined in this report. For example, if the length is less than about 250 yards for a short individual hole or on a miniature course, the number of "lighting planes" would be reduced. On the diagram (Fig. 1) the lighting poles and lighting planes are indicated for the tee,

AUTHOR: General Electric Co., Nela Park, Cleveland, Ohio.

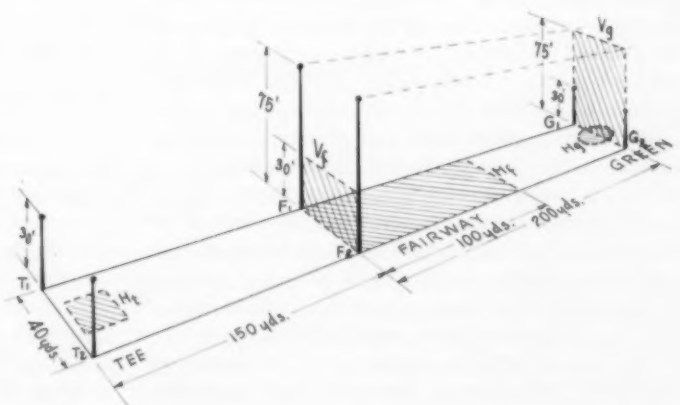


Figure 1. This lighting design plan for a typical hole of a golf course puts light upon each tee, fairway, and green individually, rather than spreading it throughout the general area.

fairway, and green areas. Lighting for the various planes is worked out separately as follows, assuming an average maintenance factor of 75 per cent.

Lighting of Vertical Surfaces

These recommendations are designed to put an illumination level of three footcandles upon the vertical surface of a golf ball in flight, at a distance of 200 yards from the player.

First let us consider the lighting from the poles at the tee area. In this case, we estimate that a total of six 1500-watt G-48 floodlamps (three on each side) should be placed at the tee area, at a 30-foot mounting height on two poles, set beside and slightly behind the tee area and at least 50 feet apart, to light the vertical plane V_f. These must be used in *very-narrow-beam* floodlights (with angular spreads down to 10 per cent of maximum candlepower, of about 13 degrees to 14 degrees). These would be aimed down from horizontal by an angle equal to half their vertical beam spread, so that the upper edges of their beams would be projected horizontally. This technique helps to give good utilization of beam lumens, for most of the beam light not directed at the vertical plane (V_f) would fall upon the ground along the fairway, adding to the illumination upon that horizontal surface. We have suggested the use of 30-foot poles because the initial drive off the tee seldom rises above that height if hit normally.

That system will provide the vertical-surface lighting for the first stroke. Probably an average golfer will hit this to a distance of 150 to 250 yards. However, this 350-yard hole is too long for us to provide adequate vertical surface illumination from the tee all the way to the green. Therefore a second stage of lighting, about 150 yards down the fairway, is recommended for the farthest vertical plane (V_g)—in this case, 200 yards away. Again we propose that six floodlights be used, with 1500-watt G-48 lamps in very-narrow-beam luminaires. Here, though, we suggest that the two poles be placed on both sides of the fairway to provide an average maintained illumination of three footcandles on the vertical plane (V_g) 200 yards beyond that point, to a total distance of 350 yards. Preferably these two poles should be tall enough to set the fixtures at a 75-foot mounting height—although practical cost limitations have usually limited this mounting height to about 40 feet. If so, the lighting effectiveness may be partially regained by using a greater number of poles at closer intervals down the fairway, and fixtures with wider beam spreads and general service lamps.

The reason for using higher poles (or towers) at this stage is that when the golfer approaches the green he is more likely to use high approach shots and chip shots, rather than the low straight drive near the ground that would be used on the drive from the tee.

The position of the poles at 150 yards, rather than 200 yards, also makes it possible to direct the lighting upon the fairway itself in a "down-stream" direction, for the horizontal lighting of H_f. Thus, a golfer whose ball falls short of 200 yards is not obliged to face a bank of lights in his further drive.

Horizontal Lighting at the Tee

The size of the average tee area, according to our local superintendent of public golf courses, is from 8000 to 10,000 square feet. Of course, the lighting plan should be modified for any significant departures from this area. In Fig. 1 we have shown the area to be approximately a rectangle in shape, 25 yards wide by 40 yards long, giving an area of about 9000 square feet in this instance. The floodlights are shown mounted at a height of 30 feet upon two poles, one on each side of the tee area. Here the narrow optical control is not needed, and 1500-watt general service lamps can be used in wide-beam floodlights (IES Type 5)—a total of eight units, four on each pole, to put about 10 footcandles on the area. This size of tee area allows for frequent displacement of the tee markers back and forth to freshly-grassed areas. The poles should be separated by about 40 yards, which in Fig. 1 is shown as the width of fairway.

We recommend that the poles be placed beside and toward the back of the tee area, maintaining the unidirectional "down-stream" character of the lighting. This will help keep the glare from the player's eyes as he faces sideways to address the ball.

The four lighting units on each pole, with these pole locations, should all be aimed about 40 degrees below horizontal. The lateral aiming angles from the longitudinal axis should be 20-25 degrees for two of the units, and 50-55 degrees for the other two.

Horizontal Lighting on the Fairway

This lighting is down from the 75-foot poles used for the second stage of vertical illumination. It is important to provide some supplementary lighting upon this area of the fairway, where it is hoped that the ball will lie after its first drive from the tee. This portion of the fairway is approximately 100 yards long and 40 yards wide, so we can put an illumination of about five footcandles upon it if we use an assortment of 28 floodlights (14 on each pole) as follows: 10 very-narrow-beam floods (IES

TABLE I—Aiming Angles for Horizontal Lighting on Fairway (H_f) Area (14 Luminaires on each 75-foot Pole)

FLOODLIGHT BEAM	VERTICAL BEAM SPREAD (IES TYPE)	LAMP DESCRIPTION	NUMBER OF UNITS	VERTICAL ANGLE BELOW HORIZONTAL	LATERAL ANGLE INWARD FROM LONGITUDINAL AXIS
Very narrow	Type 1	1500-watt G-48	1	19°	5°
Very narrow	Type 1	1500-watt G-48	1	18°	9°
Very narrow	Type 1	1500-watt G-48	1	18°	15°
Very narrow	Type 1	1500-watt G-48	1	17°	18°
Very narrow	Type 1	1500-watt G-48	1	17°	22°
Narrow	Type 2	1500-watt general service	2	28°	7°
Narrow	Type 2	1500-watt general service	1	26°	34°
Medium	Type 4	1000-watt general service	3	54°	24°
Medium	Type 4	1000-watt general service	3	52°	57°

Type 1); 6 narrow-beam floods (IES Type 2); 12 medium-beam floods (IES Type 4).

The very-narrow-beam units use the 1500-watt G-48 floodlight lamp, the narrow-beam units use the 1500-watt general service lamp, and the medium-beam floods use the 1000-watt general service lamp. Their aiming is indicated in Table I. These calculations apply for 75-foot mounting heights, which may not be practical, as noted before. Furthermore, this aiming arrangement might be suitable only for an isolated fairway. Shifting the poles will often permit their dual-purpose use, for lighting adjacent holes, and will avoid glare onto opposing fairways.

As we have pointed out, this area of the fairway is especially important because the average drive from the tee will fall here, and the illumination should provide adequate visibility for the golfer to make his second stroke. It might seem that we have neglected the rest of the fairway, in this matter of horizontal illumination, but considerable light is contributed as "spill" from the beams of the floodlights that are aimed to give vertical illumination upon the surface of the ball in flight. Sample calculations show that the average horizontal illumination over the remainder of the fairway is between one and two footcandles.

Horizontal Lighting at the Green

The average size of this area is estimated by our local superintendent to be about 5000 to 7000 square feet. The lighting is provided by two 30-foot poles, located about 40 yards apart on both sides of the green, in line with its center. If we use a total of six 1500-watt general service lamps in wide beam (IES Type 5) floodlights, this will put about ten footcandles on an area of 6000 square feet. Usually the green is circular or oval in shape; for this example we have assumed it to be in the shape of an ellipse, but with equivalent rectangular dimensions of 75 feet width and 80 feet length for a rectangle having the same area. For this mounting position, the beam centers are all aimed at 55 degrees from the vertical (35 degrees below horizontal). The 40-yard separation of the poles helps to remove a source of possible obstruction from the green area, but not so far as to give serious nonuniformity of the lighting.

Lighting the Rough

This basic plan has not included any specific recommendations for lighting any part of the "rough" except for that covered by the spill light from the fairway. Depending upon the skill of the players, the nature of the rough, and various traps, hazards, and bunkers, supplementary lighting may be needed for such locations. Usually this could be provided by 150-watt PAR-38 floodlamps, mounted on devices to fit the terrain—for example, on ten-foot pipe stands behind trees and bushes, or at sand traps. Care must be taken that these extra sources will not glare into the eyes of the golfers who remain on the fairway.

Energy Requirements and Supply

The lamps included in the recommendations are all of the multiple 120-volt design. With the amount of annual use contemplated, we would wish to operate them at rated voltage, and not at overvoltage as in certain other seasonal floodlighting applications. Primary distribution would probably be at higher voltage, and might be either overhead or underground, with pole-mounted transformers. Secondary distribution would most likely be underground; direct-burial cable might be the most practical. While trenching runs would be long,

TABLE II—Estimated Wattage Requirements for 350-Yard Hole

TYPE OF LIGHTING	LIGHTING PLANE	NUMBER OF LAMPS	LAMP WATTS	KILOWATTS REQUIRED
Vertical	V_f	6	1500	9
	V_e	6	1500	9
Horizontal	H_f	8	1500	12
	H_f	16	1500	24
	H_f	12	1000	12
	H_e	6	1500	9
				75 kw total

the only apparent interference might come from water pipes. However, for the trial lighting system on this one hole, overhead conductors could be used temporarily—perhaps one string along each side, to avoid bringing the wires across the fairway. The estimated wattage requirements for this one-hole trial system are listed in Table II.

Estimates for Holes with Other Lengths and Areas

The basic lighting plan as outlined up to this point has been calculated specifically for a par-4 hole, 350 yards in length. The dimensions, design values of illumination, and calculated wattage requirements are summarized in Table III. They are shown separately for each of the five lighting planes used in this example.

This method of calculation, to be most useful, has been extended to permit estimating wattage requirements for holes with other lengths and areas. Thus we have shown how the number of lamps (and total power) required can be expected to vary with the changes in dimensions. The resultant multiplying factors are also included in Table III.

For the vertical lighting planes, the most important variation is in the distance that the beam must be thrown. Even with the very-narrow-beam floodlighting units, part of each unit's main beam is lost as "spill light" around the outside of the lighting plane. Therefore, the number of floodlights needed is determined chiefly by the inverse square law, and is estimated as being in direct proportion to the square of the distance of beam throw. This is expressed here as a ratio, related to the distance of beam throw already used for each vertical lighting plane in the example.

The areas of the vertical lighting planes most

TABLE II—Summary of Basic Lighting Plan for 350-Yard Par-4 Hole with Estimating Factors for Other Dimensions

	LIGHTING PLANES				
	V_f	V_e	H_f	H_f	H_e
Dimensions in Example:					
Width (feet)	120	120	75	120	75 (a)
Height (feet)	30	75	----	----	----
Length (feet)	----	----	120	300	80 (a)
Area (square feet)	3600	9000	9000 (b)	36,000	6000 (c)
Design illumination (average maintained value)	3 fc	3 fc	10 fc	5 fc	10 fc
Power required, kilowatts	9	9	12	36	9
Multiplying factors to estimate wattage for other lengths and areas:					
Factor for other beam-throw distances ("D" in *yards*)	$\left(\frac{D}{150}\right)^2$	$\left(\frac{D}{200}\right)^2$	----	----	----
Factor for other lighting-plane areas ("A" in *square feet*)	$\frac{A}{3600}$	$\frac{A}{9000}$	$\frac{A}{9000}$	$\frac{A}{36,000}$	$\frac{A}{6000}$

(a) Dimensions of equivalent rectangle with approximately the same area as ellipse 85 × 90 feet.
(b) Typical range: 8000 to 10,000 square feet.
(c) Typical range: 5000 to 7000 square feet.

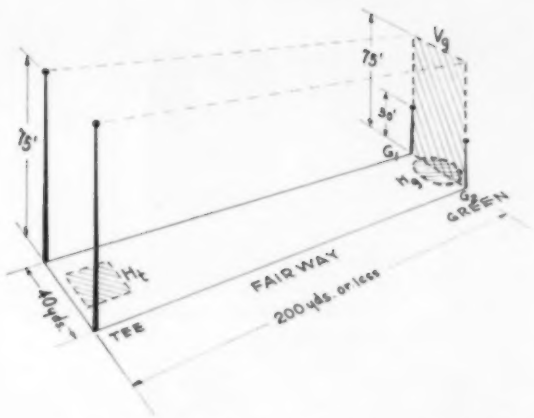


Figure 2. A single-stage lighting design, such as this one, could be used for a shorter hole — one which is less than 250 yards long.

likely would remain constant, but in case they did change, the number of lamps (and total wattages) would vary in direct proportion to the lighting-plane areas. These factors also are expressed here as ratios, based upon the lighting-plane areas used in the example.

The horizontal lighting planes are more likely to vary in area, which must be taken into account when estimating the lighting requirements for other holes. For these horizontal planes, though, the distance of beam throw is of little importance, and is not included as a factor in these estimates. That is because wider-beam floodlights can be used and their beams are more fully utilized than the beams upon the vertical planes. As indicated previously, the beams from the various floodlights must be aimed and overlapped to give uniform illumination upon the horizontal planes. Furthermore, the distances of beam throw are not likely to be much changed, so the inverse-square law becomes of relatively little importance.

Short Holes with Fewer Lighting Planes

The previous discussions and calculations have all applied for a specific example—a par-4 hole, 350 yards in length. Fig. 1 showed this as being lighted in two stages (*i.e.*, with two vertical lighting planes) with a pair of poles to give a 30-foot mounting height at the tee, one pair of 75-foot poles near the middle of the fairway, and a final pair of poles to give a 30-foot mounting height at the green. This kind of lighting design can well be applied to a hole that is between about 250 and 350 yards in length, with a fairway having not more than a single curve or sharp bend in it. A shorter hole, less than 250 yards long, could probably be lighted in a single stage, as illustrated in Fig. 2, In that case we would eliminate the vertical (V_f) and horizontal (H_f) planes, but would raise the poles at the tee area (T_1 and T_2) to a 75-foot height. Such added height would enable their floodlights to cover the full 75-foot height of the V_g plane as was done before, to allow for the higher shots that would likely be used on a shorter hole.

The estimates are based upon the use of enclosed floodlights. For short holes, 300-watt or 500-watt reflectorized lamps might well be used instead, perhaps with some saving in equipment cost. There is likely to be more "spill light" from these lamps, so we suggest that the wattage requirements be increased by about 50 per cent at each hole where such lamps are used instead of the larger enclosed floodlights.

For example, an average tee area might be lighted by about six of the 500R/3SP lamps; likewise the green could use about twelve such lamps. The fairway lighting, if the hole is only 80 yards long, could be done with about 1.6 kw of enclosed equip-

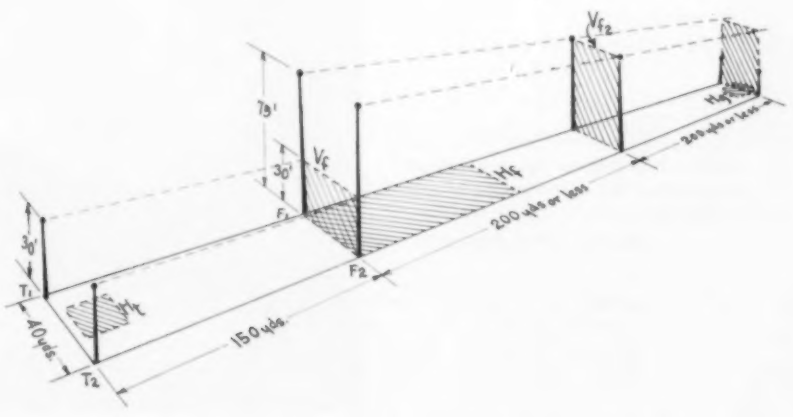


Figure 3. Suggested three-stage lighting design for a longer hole—up to approximately 550 yards.

Figure 4. Weekend golfers get a chance for mid-week practice rounds at this night-lighted par-3 course in San Jose, California.

ment (probably two 1000-watt general service lamps) or about five of the 500PAR64/NSP narrow-beam projector lamps.

As in choosing the beam pattern needed from an enclosed fixture, the choice of reflectorized lamp requires that we calculate the angles subtended by the "lighting plane" for each hole. Then the lamp with a beam spread most nearly matching those angles would be the best choice.

Longer Holes with More Lighting Planes

A hole longer than about 350 yards, on the other hand, would require additional stages of lighting. As shown in Fig. 3, three stages could cover a length up to about 550 yards, unless there were more than two sharp bends or kinks in the length of the fairway, or unless such bends were very irregularly spaced. For such longer holes, the additional sets of floodlights throughout the length of the fairway would probably be mounted upon 75-foot poles, as shown. However, we would limit the supplementary *surface* lighting of the fairway to the same single H_f plane as in the original example unless the terrain made it important to add supplementary lighting to a specific additional H_f plane, where the second shot would be likely to fall, such as in a limited area just short of an abrupt bend in the fairway.

Figure 5. Nighttime golfer tees off at San Jose course. Note fairway lighting (about five footcandles) in background. Illumination level on greens is ten footcandles.

A.I.A. File No. 31f

INSTALLATION AT BOB FORD INC., 14585 MICHIGAN AVE., DEARBORN, MICH.

Lighting a Used Car Lot

LIGHTING OBJECTIVE: To provide attention-getting general lighting and floodlighting for merchandising used cars.

GENERAL INFORMATION: This car lot has a 240-foot frontage on a main thoroughfare and a depth of 100 feet. The lot's surface is asphalt with a light cement top coat of 45 per cent reflectance. The surface is serviced twice yearly to maintain a good reflecting surface for providing fill-in lighting on the lower portions of the cars.

Curbing is placed seven feet in back of the property line to keep the cars in line and to allow for floodlighting the cars' grillwork.

INSTALLATION: Floodlighting for the front row of cars is provided by two 500-watt PAR-64 medium flood lamps and four 300-watt PAR-56 lamps (two spot and two medium flood), a total of six lamps, mounted 14 feet above ground on each of seven poles spaced on 30-foot centers along the property line on Michigan Ave. The two 500-watt units are mounted on the ends of a 22-inch wiring trough, Stonco Electric Products Co. catalog No. 15. Two of the 300-watt units are mounted on the top and two on the bottom of the trough. All these units are catalog No. 6400 and are aimed at the grilles on the front row of cars.

General lighting is provided by rows of string lights, 200-watt, inside frosted bare bulbs, spaced on 2-foot 6-inch centers. A row is mounted 12 feet above ground at the property line for lighting the front row of cars. A second row is mounted 32 feet from the first. A third and fourth row are mounted 25 feet and 50 feet, respectively, from the second row.

The floodlighting and general lighting provide an average level of between 500 and 1000 footcandles on the grillwork on the front row of cars. The general lighting provides an average level of 20 footcandles on the other rows of cars.

Lighting designed by James F. Finn, The Detroit Edison Co., Detroit, Mich.

Lighting data submitted by James F. Finn as an illustration of good lighting practice and to aid in the design of similar installations.

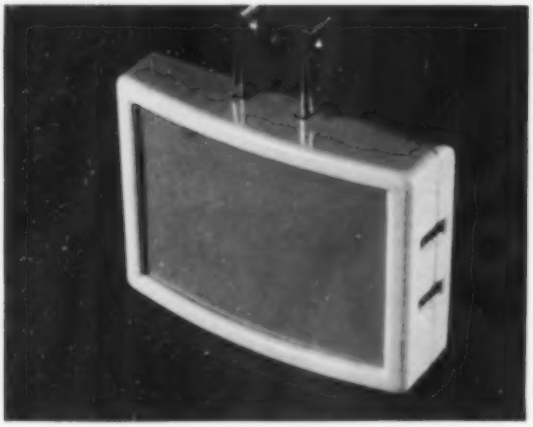
Published by the Committee on Publications of the Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y. This is one of 24 different sheets in Series XXV. Subscriptions to the entire series may be purchased from the Publications Office, IES Headquarters, or quantities of individual sheets, minimum 100, may be ordered.

Series XXV
3-61

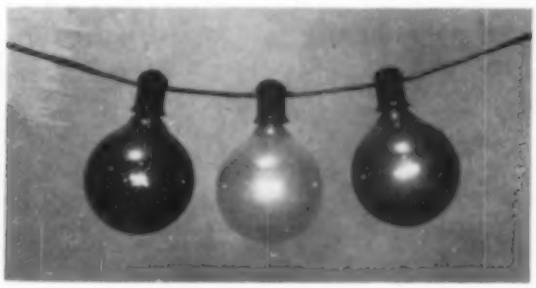
A.I.A. File No. 31f

NOW AND FUTURE

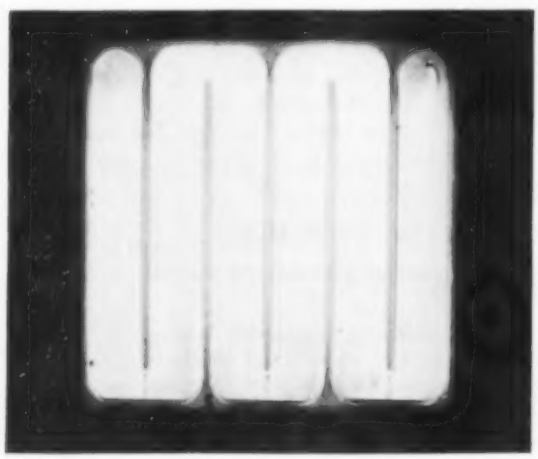
Like the proverbial riddle of which comes first . . . the chicken or the egg . . . developments in light sources are constantly influencing lighting trends—or are they following new techniques? Either way, lamp development is a dynamic phase in lighting practice. Some recent developments in this field are shown on this page and the two that follow.



New electroluminescent night light that plugs into wall outlets has hinged connector prongs so that the lighted surface can be mounted either parallel or at right angles to the wall. Three electrical outlets located on one side and two ends of the device make it a handy three-way receptacle for plugging in lamps or other appliances.



New 25-watt G40 globular bulbs, five inches in diameter, are available in silicone colors red, blue and green. These colors are pure, transparent and better balanced than opaque colors. Bulbs are weatherproof and can burn in any position, both indoors and outdoors.



Latest addition to the line of fluorescent "whites" is a lamp which provides more light in the red end of the spectrum for better color rendition of skin tones, foods and fabrics. The lamp is expected to be especially useful in supermarkets, restaurants, stores, public buildings, and wherever color warmth is important for creating attractive merchandise displays. Comparison of this new color with the standard cool white fluorescent is shown above; the twin at right is being illuminated by the new lamp.

◀ Flat rectangular fluorescent lamp, soon to be marketed, is composed of a labyrinth of passages sealed in a thin glass block, with the electric discharge travelling the winding path to produce a large area light source. The prototype of the lamp is about a foot square and an inch and a half thick, with compact rear contacts. It is designed for modular installation. The lamp is equipped with a reflector on the back and patterned glass on the front to control brightness and direction of the light. The 12-inch square models will be 40- to 50-watt lamps.

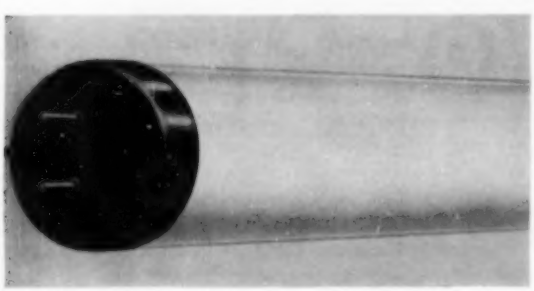
LIGHT SOURCES

New line of smaller, cooler burning, lighter weight 75-watt R30 reflector floodlamps is available in six colors—blue, red, green, pink, amber and yellow. The lamps are expected to find wide use in display lighting, floodlighting and decorative lighting.

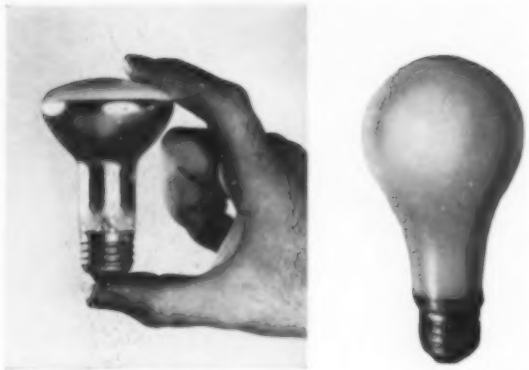
Smaller, more compact lighting equipment for the 8-mm home movie camera is this hand-held unit equipped with a halogen lamp in a 2¾-inch reflector, reported to provide the same effective light as an 18-inch light bar equipped with four R30 photofloods. The lamp operates on 110/120-volt, a-c, 60-cycle circuit and draws 650 watts as compared to 1200 required for four R30's. It is balanced for 3400°K, allowing it to be used without filters with Type A color film as well as black and white. The entire lighting unit (without mounting bracket) is 9¾ inches high, 4¾ inches wide and 2½ inches deep. It comes equipped with an adjustable mounting bar which will fit any standard make 8-mm camera, and a convenient 12-foot extension cord.

SAH-250B, 250-watt short-arc mercury lamp (far right) which operates from direct current, is said to be particularly useful in optical inspection devices, microfilm reading, projection service and as a signalling beacon or navigation searchlight in marine applications. Rated at 10,000 lumens with an arc brightness of 250 candles per square millimeter, it has an average life of 250 hours.

Smallest of the reflector photographic sources is this 200-watt R20 lamp (right), said to produce as much light as a 300-watt reflector lamp. It is a high-efficiency lamp of 4 hours' design life, has a color temperature of about 3400°K and "medium" beam spread. Candlepower in the central 10-degree cone averages 10,500. An opaque coating over the lamp neck reduces stray light. Due to its compactness, the lamp is well suited to mounting on small light bars and makes possible lighter weight, portable equipment for amateur movie making.



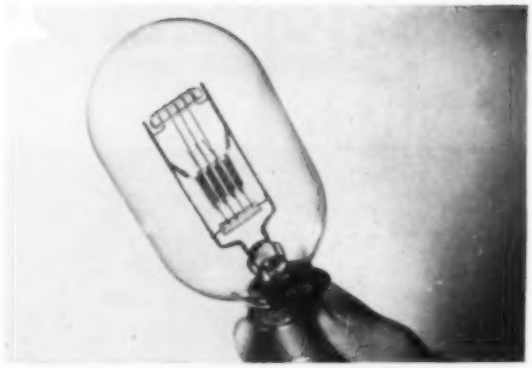
Designed for economy in lighting costs, this new high efficiency 40-watt fluorescent lamp, which is rated at 3200 lumens compared to 2800 for the usual 40-watt fluorescent, is reported to provide 15 per cent more light than standard cool white lamps, 36 per cent more light than daylight lamps. The color of the new lamp, produced by a special compound of green phosphors, balanced by red, is said to give good rendition of all colors and the complexion. The lamp is available in preheat, rapid-start design, as well as 96-inch slimline size to fit all present fixtures and ballasts.



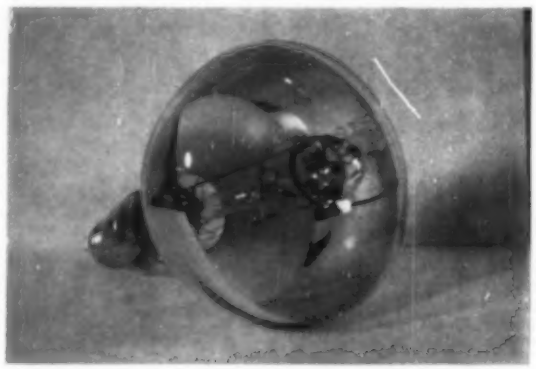
Compact R20 reflector lamp (left) is a new 50-watt floodlamp for residential, commercial and industrial use. Controlled beam can be used for highlighting, display and supplementary lighting. Lamp is useful in applications requiring a small lamp but more light than is provided by the older 30-watt R20 reflector lamp.

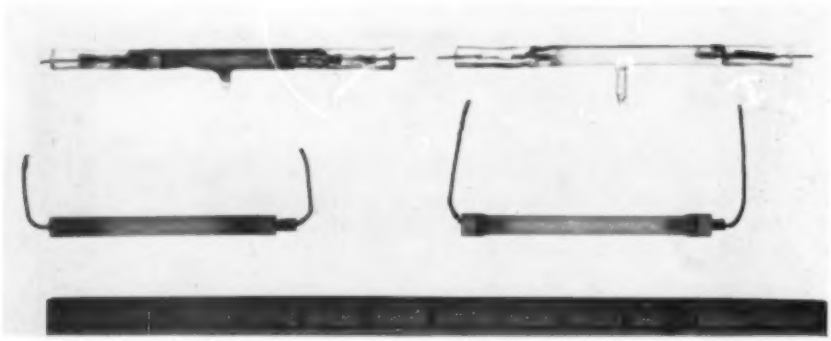
Atomic hydrogen incandescent lamp (above, center), now in the development stage, was recently granted a patent. The lamp is hydrogen filled and operates so that the incandescent filament disassociates hydrogen, the hydrogen atoms recombining on the special phosphor. The recombination of hydrogen atoms on the phosphor activates it, producing additive or additional light output. The cycle repeats and continues throughout the life of the lamp.

Self-ballasting mercury lamp developed in a 450-watt R57 size has self-contained metallized reflector so that no external fixture is required. Phosphor coating over portion of reflector together with ballasting filament provides good color rendition.



New compact 1000-watt T20 stage lighting lamp developed for the new Broadway musical "Camelot." Lighting consultant Abe Feder faced need for brilliant lighting on small stage where lights are hung in less than one-foot depth. Two new lamps (T12 not shown) cut lighting space requirements in half.





Still in the laboratory stage is a cesium lamp in a newly-developed polycrystalline alumina ceramic envelope. The lamp is an alkali metallic vapor type in the electric discharge family which may operate in air, requires no external envelope and has good energy distribution throughout the light spectrum, resulting in excellent color rendition, without the use of phosphors or other coatings. Work on the lamp was made possible by the development of the new ceramic which can withstand much higher temperatures than most ceramics now in use. Cesium vapor will blacken a quartz envelope within a few seconds of operation at 500°C (top, left), yet produces only slight end darkening after hundreds of hours of operation in the new ceramic (bottom, left). At right are unoperated cesium lamps, in quartz envelope (top) and in the new ceramic envelope (bottom). The current developmental cesium lamp is said to provide excellent color quality at an efficiency of 35 lumens per watt. Projected applications would be in industrial, commercial, defense, street lighting and other outdoor fields.

Protection against ballast failure

A thermally-sensitive protective system as an added value in ballast design

By SCOTT HELM

ONLY IN RECENT years has the general subject of protection for fluorescent lighting systems been of interest to the lighting user. Perhaps this recent interest is a result of the ever increasing acceptance of fluorescent lighting and with it, increasing application experience. Or perhaps it results from the attention given to this subject by the fluorescent ballast industry.

For many years the occasional problems associated with fluorescent lamp ballasts at the end of their normal life have been recognized and discussed by the ballast manufacturers. The fluorescent ballast industry, through continuing development effort, has sought an economical device that would reliably eliminate any undesirable conditions that might occur as a result of ballast failures.

Over a period of years, observation and analysis of the various types of ballast circuits have revealed that there are three general types of failure conditions, some of which may not result in objectionable conditions. In the first type of failure, such as shorted filament windings in a rapid-start ballast, the ballast will continue to operate without any indication of trouble until the failure is detected through lamp outage, or until it progresses and affects other components to the point where a more severe type of failure develops.

The second classification of failures includes those which result in higher than normal currents, with a resultant temperature rise within the ballast. If allowed to persist, this condition could result in property damage and inconvenience. The third class is the violent failure resulting in obviously excessive temperatures within the ballast or immediate opening of the branch circuit protective device. For example, primary windings of a ballast may develop such a severe short that within minutes smoke and fumes, resulting from the very rapid deterioration of the organic insulating materials from the coil, will appear, causing discomfort and concern to the user. Development of a low impedance ground will generally not create a hazardous condition in the ballast if proper branch circuit devices are provided in accordance with electrical code requirements.

In practice, the first type, "quiet" failure at the end of normal ballast life, so subtle that it generally cannot be detected until the lamps fail to light, is certainly the most predominant. While the second class of failure is not unusual, the violent failure condition will rarely develop. Regardless of the type of failure, however, the functional need for protection against such conditions has challenged ballast engineers to develop an economical means for eliminating the occurrence of conditions that can lead to damage or inconvenience at the end of ballast life.

Consideration of the various approaches to this solution involves a number of relevant factors:

(1) Observation reveals that failure of components within the ballast can produce excessive internal temperatures causing leakage of asphaltic filling material, or releasing volatile gases from the organic insulation in the ballast. The internal

AUTHOR: Ballast Department, General Electric Co., Danville, Ill.

currents resulting from some of the more common component failures would not be reflected as excessive current on the input to the ballast. Consequently, a purely current sensitive device located in the primary circuit would not reliably sense all hazardous conditions.

(2) Under certain abnormal operating conditions of relatively short duration in specific ballast ratings, coil temperatures may increase significantly. For instance, with series sequence instant-start circuits operating under the abnormal condition of one lamp out, coil temperatures may increase to as high as 135°C within hours. Prolonged operation under this abnormal condition will seriously shorten expected ballast life as would be expected. However, due to the ballast design, this condition, existing for a short time, will not result in ballast failure. This kind of short duration condition must be recognized as a problem exterior to the ballast. While internal temperatures will increase, this increase does not signify failure of the ballast components.

(3) Inherent in the power factor correction capacitors commonly used in ballasts has been the problem of "thermal runaway." Thermal runaway is a destructive condition resulting from the very rapid deterioration of the capacitor insulation usually near the center of the capacitor roll. This deterioration releases gases from the organic insulation and these gases may develop sufficient internal pressure to cause the capacitor to rupture, thus allowing the liquid dielectric to leak from the capacitor. The thermal runaway condition can develop without causing any excessive current or temperature in other components of the ballast. Thus, leakage of dielectric and partially dissolved asphaltic filling material can occur without being accompanied, initially, by the usual temperature rise in the ballast.

(4) When the ballast has failed with the failure of any component, it should be permanently disconnected from the power source to avoid any resultant hazardous conditions.

When the functional need for protection against the occurrence of undesirable conditions and the various possible failure conditions are considered, the complexity of the ballast protection problem becomes apparent. Add to this the requirements of low cost (adaptable to mass production) and assured reliability and the real challenge to the ballast designer is evident.

One approach to this problem of adequate protection is to provide, within the ballast case, protective devices designed and applied to de-energize the ballast permanently when a component failure, which may cause an undesirable condition, occurs. In view of the problems previously discussed, this protective system is primarily temperature sensitive and only slightly current sensitive. Additionally, and specifically related to the occasional problems of thermal runaway within the power factor correcting capacitor, a temperature-sensitive device located in the center of the capacitor roll is designed to de-energize the capacitor prior to the occurrence of temperature conditions that will result in internal pressure, possible rupture and leakage.

The protective device, whose function it is to detect potentially dangerous conditions resulting from shorted components such as windings, is designed to be sensitive to the excessive temperatures that can cause leakage, yet insensitive to those abnormal conditions, such as lamp failure, which are external to the ballast and not sufficiently severe to produce hazardous conditions. To prevent leakage of filling material, this device must be critically sensitive to a temperature below the melting point of the filling material. Extensive life tests performed to date on this system under both normal operation and controlled failure conditions in simulated field application conditions have proven the functional reliability of this system.

Other protection methods have been applied to ballast circuits in recent years. The success of each can only be measured against the functional need or design objective set forth for each one. As each has been put into practice, certain limitations have been recognized. Fuses, being primarily current sensitive, cannot recognize many of the subtle types of failures, including the capacitor thermal runaway condition, until these conditions have become sufficiently aggravated to result in a noticeable increase in line current. Experience indicates that hazardous conditions can occur which an external fuse will not sense in time.

Temperature-sensitive devices which will recognize over-temperature conditions and de-energize the ballast when temperatures in excess of their setting occur have also been employed. However, these devices are designed to the functional objective of preventing over-temperature conditions and do not recognize that the usual cause of excessive temperature in a properly applied ballast is component failure. Furthermore, due to their physical size and complexity, these devices cannot be readily integrated into the ballast capacitor to detect the thermal runaway condition.

With the development of the thermally-sensitive protective system described, the fluorescent lighting industry can benefit from the design philosophy of prevention of hazardous conditions resulting from component failure at the end of ballast life.

INSTALLATION AT ALLIED PACIFIC MANUFACTURING CO., COMPTON, CALIF.

Industrial Lighting

LIGHTING OBJECTIVE: To provide a comfortable working area with general illumination for performing medium bench and machine tasks.

GENERAL INFORMATION: This large machine shop is irregular in shape, as is shown in Fig. 2. Ceiling height is 18 feet. Colors and reflectances of the major room surfaces are: ceiling, light tan, 65 per cent reflectance; upper walls, light buff, 65 per cent reflectance; lower walls, medium buff, 30 per cent reflectance; and floor, light cement, 35 per cent reflectance.

INSTALLATION: There are 217 Smoot-Holman catalog No. D-388 industrial-type luminaires installed in this area. These units are mounted 12 feet above the floor in continuous rows spaced on 10-foot centers. Each luminaire is equipped with three 96-inch T-12 cool white rapid-start lamps operated at 800-ma, and is designed to permit a 12 per cent upward component of light.

After approximately 200 hours of lamp operation and with all equipment in place, the average level of illumination was 180 footcandles. Brightnesses were: luminaire reflector, 500 fL inside and 50 fL outside; ceiling, 20 fL; upper wall, 80 fL; lower wall, 35 fL; floor, 30 fL.

Figure 2. Plan of machine shop area.

Lighting designed by Melvin V. Paul, Lighting Consultant, Southern California Edison Co., Compton, Calif.

Lighting data submitted by Melvin V. Paul and Laddie Tilson, Area Lighting Engineer, Southern California Edison Co., as an illustration of good lighting practice and to aid in the design of similar installations.

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PRODUCTION LIGHTING

. . . a trend in industry

If ever a phrase could be said to expound the obvious it would be this: Good Lighting Pays. To thousands of plant managers, however, that statement does not refer to ambiguous advantages of morale, prestige or esthetics, although these have their places, to be sure. For the plant managers, "paying" has dollars and cents significance—higher industrial output, fewer rejects. These are meaningful benefits, whether from lighting, improved machinery or any other production tool. The fact that *good* lighting is now a recognized, appreciated and widely accepted *production* factor is one of the most interesting trends in industrial lighting.

An entire technical paper complete with cost analyses could no doubt document this trend, step by step. In summary, though, it would add up to continual progress in lighting techniques and equipment, with a large assist from relative costs of light. Progress in light sources has permitted more light from the same socket, higher and more uniform light output throughout lamp life (such as with the oxide electrode lamps) and lower cost of lamp maintenance, to name only the more recent developments. Progress in fixture design has increased comfort and reduced maintenance. Application techniques developed for industrial areas have been intended to contribute to higher industrial production and fewer rejects. Several examples of the developments are illustrated on this and the next three pages. Data and photos courtesy E. A. Linsday, General Electric Co., Cleveland, Ohio.

Bookbinding, while not as critical a seeing task as composition, nevertheless benefits from *production* conditions such as those in this relighted area of the General Bookbinding Co. in Cleveland. Illumination level is 160 footcandles maintained from 1500-ma lamps in well-designed industrial fixtures mounted at 12 feet on 9½-foot spacing. Note the "before" contrast with the old section of the plant (background) not yet relighted. Additional advantages of good lighting to the company are flexibility of production space and higher employee morale.

▲ Fixtures designed for comfort, illumination levels meeting IES recommended practice and "office-like" attention to quality all add up to *production* lighting at Burroughs Adding Machine plant in Cincinnati. Levels are 150 footcandles from standard slimline lamps in two-lamp units mounted in continuous rows, 5 feet apart.

◀ Accuracy and speed are essential to commercial survival in the printing industry. This composing room no longer needs supplementary lighting for quick, sure work. Rows of high-output lamps on two-foot centers, shielded by plastic egg-crate louvers, provide 300 footcandles maintained.

Maintained lighting levels of 250 footcandles, fixture placement for maximum comfort and air conditioning are major contributions to *production* lighting in the meter assembly area (below) at Assembly Products, Chesterland, Ohio. Two lamp, 1500-ma units are at low (7½-foot) mounting on 7-foot spacing.

Acceptance of light as a tool of *production* is well exemplified in this foundry (bottom), a traditionally dismal area. Lighting level is 175 footcandles maintained (220 footcandles, initially) from 400-watt mercury lamps in twin, open-top fixtures. Further good use of the lighting is afforded by the reflectances, unusually high for a foundry. Ceiling reflectance is 50 per cent, walls, 40 per cent and floors, 25 per cent.

Higher mounting for fluorescent (left) is an application development which is becoming more and more popular. Some are even higher than this example, a Louisiana maintenance and repair shop where 1500-ma, two-lamp units are mounted across the narrow area at a 25-foot mounting height with 5 feet between rows. Production lighting of 90 footcandles is provided after 400 hours of operation. Note quality aspects of the installation, light surfaces and uplighting—a growing trend.

Fluorescent and mercury lamp combination (right) is another recent trend. In this heavy industry area, replacement of the 1000-watt filament lamps which previously accompanied the mercury with 1500-ma, two-lamp units, increased the illumination level, decreased the power consumption. Combination here is 35 per cent F96PG17/CW fluorescent, 65 per cent H400-RC1 mercury. Mounting height is 47 feet with spacing (18 feet 2½ inches by 12½ feet) determined by the bays. Lighting level was 72 footcandles after 100 hours.

Light surfaces aid this 200-footcandle installation (left) in providing production lighting conditions for this fine wire manufacturing area (Deluxe Coils, Inc., Wabash, Ind.). Illumination is from 1500-ma lamps in two-lamp fixtures mounted on 8-foot centers.

Views and Opinions

The Labor of Technical Writing

Following the accomplishment of each research, investigational, or study assignment there is usually the need to prepare a report or paper of one kind or another. Very often, realization of the value of results from this work is highly dependent upon the report's effectiveness. This places a heavy responsibility upon its author. To some extent, it may be on this account that many find the writing of the technical report to be a very difficult, exacting, and laborious task. Yet the pain and trouble of report writing is seldom discussed; usually it is overlooked or ignored entirely. Perhaps it is time to give the matter some open consideration.

A first reaction may be that this subject is of small importance and applies only to an unhappy few who should have learned better how to write. When we consider, however, the expanding files in laboratories and offices of research and development activities, the increasingly voluminous technical literature, and the growing abstract services, the size of the problem becomes apparent. An enormous amount of money and talent is being poured into the work represented by this literature, and the information so developed is vital to progress in science and industry. Any restriction that impedes the flow or impairs the quality of this information is indeed a problem, and one of first-order importance.

To understand the trials of a report author is not simple. There are those who explain that technical writing is made difficult by limitations of a language inherited from a nontechnical past. There may be some truth in this, but the complaint is largely offset by the introduction of the more precise symbols and terminology of science and by the use, where necessary, of the exact language of mathematics.

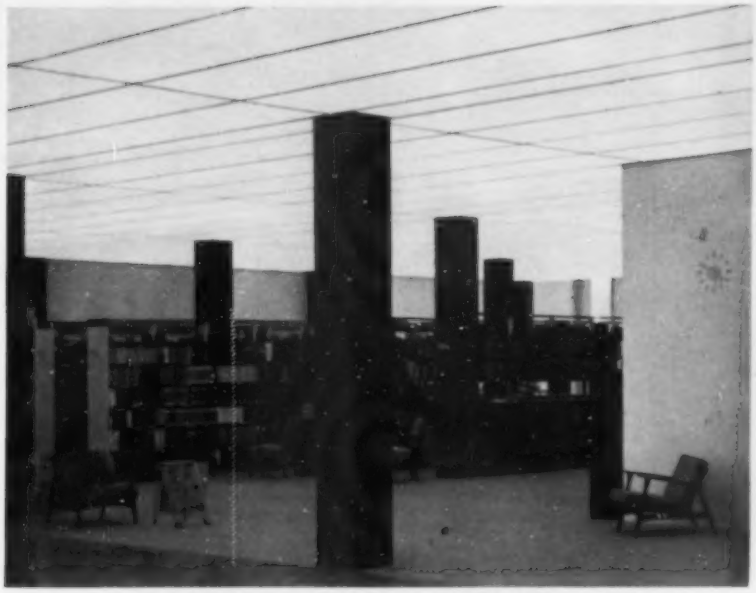
A more likely reason is that the writer tries to outdo himself. Accomplished writers are rare in any case. Yet the technical author may feel that the importance of his work requires an exceptionally fine piece of writing. Then he has a problem. Since no one likes to admit an inadequacy, he is inclined to labor away prodigiously without complaint.

Many employers and supervisors fail to realize the difficulty and magnitude, for most people, of report preparation. The result is that too little time and inadequate facilities are provided. Under such conditions it is very common for reports and papers to be written at home and outside of business hours. An understanding employer will allow this time during office hours so that the writing may be done properly and without interference.

In one case, at least, a company has provided several noise-free rooms called "Think Cells" where an engineer may sit at a desk to work out a problem or write. To be effective, such rooms should be of sacred solitude and free from telephone and intercom.

Especially in large organizations it is becoming more common to provide professionally trained editorial assistance to technical authors. This is enormously helpful, of course, and serves the double purpose of assuring better quality of report language and arrangement while helping authors to improve their own capabilities. One must be careful in this case that the author does not rely too heavily on the editor. Certainly the original draft must be prepared by the author before any improvements are attempted by others — only he knows what he wants to say. Furthermore, the hardest part of a first draft is thinking through the subject and organizing it in an outline. This is the author's responsibility and cannot be delegated to an editor.

More helpful than anything else would be a greater general awareness of the importance and highly practical need for better developed writing competence among scientists and engineers. This takes us directly back to the classroom. With rather few exceptions, the effort in technical schools and colleges is toward providing the student with understanding and knowledge in specific subjects. Later, in practice, this enables him to produce good professional results of his own. All too often, it is only then that he discovers his need for a better ability to write. Greater emphasis must be given to this whole matter of self-expression during the course of technical education and training. Only in this way can this half-hidden problem be met in proper fashion. Technical development and output is the lifeblood of our present economy and of the future. Nothing must be allowed to hamper its flow. — *Walter J. Smith, Chemical Engineer, Arthur D. Little Inc., Cambridge, Mass. Reprinted from* ASTM Bulletin, *December, 1960.*



INSTALLATION AT MAXWELL MacODRUM LIBRARY,
CARLETON UNIVERSITY, OTTAWA, ONT.

Lighting a Library

LIGHTING OBJECTIVE: To provide general illumination and a comfortable environment in a combination reading room and stack area of a library.

GENERAL INFORMATION: This library, which is located on a new and spacious university campus, was built to accommodate 96,000 volumes and to seat 400 readers. The stack and reading area shown above measures approximately 51 feet wide by 130 feet long. The height from plastic ceiling to floor is 11 feet 6 inches. General stack dimensions are: height, 7 feet 6 inches; width, 1 foot 6 inches; and aisle, 2 feet 10 inches (see Fig. 2). Colors and reflectances of the major room surfaces are:

ceiling plenum	white	90%
walls	straw yellow	75%
	light gray	85%
columns	deep green	20%
floor, carpet	salt and pepper tan	20%
tile	gray	15%
stacks, ends	light tan	65%
blinds	translucent vinyl	50%

INSTALLATION: Single lamp channel units (Wakefield Lighting Ltd., London, Ontario), equipped with 40-watt, T-12 standard cool white fluorescent lamps, are mounted in continuous rows on 24-inch centers 16 inches above a corrugated vinyl Wākon plastic ceiling. The vinyl is supported on aluminum tee tracks, which have a baked white enamel finish, and the corrugations are at right angles to the lamp axes.

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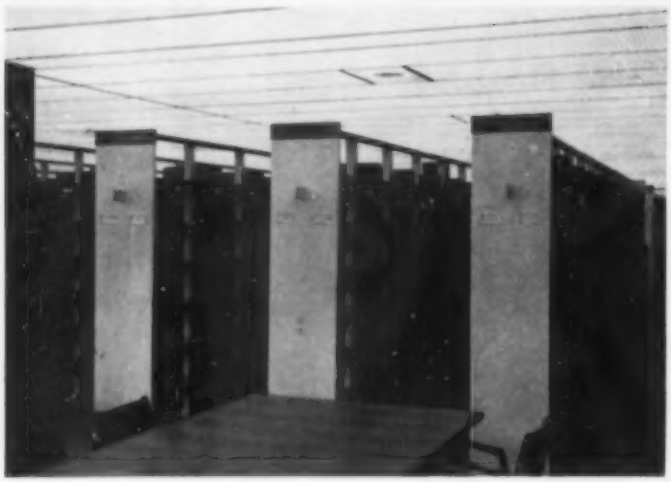

Figure 2. View of stack area shortly after completion of installation but before books were placed on shelves.

After two years' operation, with no ceiling maintenance, the average horizontal level of illumination in reading areas was 110 footcandles. In the stack areas illumination values were:

7½ feet above floor,	horizontal	120 fc
	vertical	50 fc
6 feet above floor,	horizontal	100 fc
	vertical	30 fc
3 feet above floor,	horizontal	50 fc
	vertical	10 fc

Brightnesses of various room surfaces at this same time were:

walls		plastic ceiling	150 fL
straw yellow	40 fL	column	10 fL
light gray	50 fL	floor	15 fL

Lighting designed by Andrew D. Miller, Consulting Engineer, 1122 Bedbrooke St., Ottawa, Ont.

Lighting data submitted by Andrew D. Miller as an illustration of good lighting practice and to aid in the design of similar installations.

Published by the Committee on Publications of the Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y.

LIGHTING NEWS

Lighting-Heating-Cooling Clinic Sponsored by New York Section, January 26

A good example of IES at its best was the extraordinarily informative clinic sponsored by the New York Section on January 26, at the Consolidated Edison Auditorium in New York City. This was an all-day, all-evening panel discussion on lighting's hottest subject—the coordination of lighting, heating and cooling systems. Numerous groups, besides IES members, had been invited and a good proportion of the 120 attending were consulting engineers, architects and builders.

Seldom would these people have a better opportunity to educate themselves on all phases of this currently urgent subject. Experts on each phase participated in a sort of "Open End" type of discussion, which tended to open up many unexpected avenues of the three subjects. The informal nature of the panel format itself contributed to the education of both the audience and the individual panel members. Particularly helpful was the guidance supplied by Ralph E. Crockett, General Electric Co., New York, who skillfully pursued and channelled the more fruitful discussions which arose. Also of value was the question period, so lively it threatened to extend the meeting indefinitely.

Panel experts participating were: Eugene R. Ambrose, head of air conditioning, American Electric Power Service Corp., New York City; Murray Quin, senior director, research department, Day-Brite Lighting Inc., St. Louis, Mo., Roy Tuttle, electrical department, Syska & Hennessy Inc., Consulting Engineers, New York City; W. S. Fisher, office lighting specialist, General Electric Co., Nela Park, Cleveland, Ohio; and moderator, Ralph E. Crockett. Chairman of the meeting was New York Section Chairman, Harold Peters of Consolidated Edison.

Following the afternoon session, the group stayed on for dinner at the Con Edison dining room, convening again for an evening session. Speaker at this meeting was Douglas Haskell, Editor of *Architectural Forum* magazine. His provocative subject: Must we sacrifice good architectural design to achieve adequate lighting, heating, and cooling in today's new buildings? Mr. Haskell stressed the fact that space is a precious commodity with the architect and that the most constructive problem for the engineers to solve would be cooling and/or heating systems which would take the least space in the ceiling.

P-R Program Approved by Council Mayer Firm Named Consultants

At its February 9 meeting in New York City, Council approved the inauguration of a public-relations program for IES. The program, which has been under study for several years, was adopted after the unanimous recommendation of the Public Relations and Information Committee headed by Gordon Wells, Day-Brite Lighting, Inc., St. Louis.

Broad objectives of the public-relations program are the enhancement of

(*Continued on page* 9A)

PANEL members at the Lighting-Heating-Cooling clinic sponsored by the New York Section of IES on January 26 included, left to right: Murray Quin, Day-Brite Lighting Inc., St. Louis; Roy Tuttle, Syska & Hennessy, Inc., Consulting Engineers, New York; Ralph E. Crockett, General Electric Lamp Division, New York, moderator; Eugene R. Ambrose, American Electric Power Service Corp., New York; W. S. Fisher, General Electric Lamp Division, Cleveland. Douglas Haskell (photo at right), editor of *Architectural Forum*, was the speaker at the evening session. Attendance at the clinic was 120 including architects, builders, consulting engineers and IES members.

LIGHTING ITEMS . . . from all over

Interesting items about light turn up in numerous magazines—lay and technical—and on pages of newspapers everywhere. A few of these have been culled for this column. Others, as our readers spot them from time to time, will be received by IE with thanks.

Light Coagulator

At the Army's famed Walter Reed Medical Center in Washington, doctors are substituting a blazing beam of light for the surgeon's knife to repair holes in the retina of the eye. . . . In a matter of minutes, the light beam produces a delicate scar that seals the holes. Otherwise real surgery may be needed, sooner or later, to prevent loss of sight. The blinding beam of light that sometimes replaces surgery . . . comes from a German invention known as a light coagulator, and in patching up damage to the retina, it does a vital job. . . . The light coagulator sends into the eye an intense ray of light which can be aimed with precise accuracy to any part of the retina. The eye's own optical system automatically focuses the light beam into the burning pinpoint that anneals the retina back onto supporting tissue without harm to the eye. "Light coagulation takes 15 minutes and the patient can get up and walk away. Before, we often waited for a detachment to develop before attempting surgery," an Army eye specialist said. FROM: *Wall Street Journal*, by Jonathan Spivak.

RAE Landing System

Bringing any sort of big airliner down to a gentle—or safe—landing is a considerable stunt. But heavy, fast, steeply sinking jet planes have made the proposition even trickier. Their pilots cannot make a so-so approach and depend on last-minute power adjustments to keep them from overshooting or undershooting the runway. They must fly "by the numbers"—at precise letdown speeds, with their wing flaps set precisely right and the noses at the correct angle. Once a 150-ton jet is committed to land, it must follow a very narrow "slot of forgiveness," never deviating appreciably as it approaches the runway.

This is not easy to do, even with good visibility . . . there have been perilously close undershoots and overshoots because of pilot misjudgment. To prevent such unpleasant incidents, the Federal Aviation Agency thoroughly tested five visual-approach aids, and it has . . . recommended one that was developed by Britain's Royal Aircraft Establishment. New York's International Airport has offered runways to be equipped with the RAE system so that pilots can try it out for themselves.

The new system, which will soon be familiar to air travelers, is remarkably simple. Twelve powerful lights are arranged in groups of three around the threshold of the runway. In front of each lamp is a filter with a red upper half and a clear lower half. In front of the filter is a two-inch horizontal slit. When an observer is about the center of the beam, the lamp looks white; in the middle it changes to pink, and in the lower half it is red.

The lamps are set pointing upward at angles that mark out the glide path. When the pilot makes the proper approach, he sees two bars of light on each side of the runway. The near group is white, the far group red. As long as they stay that way he is doing all right, but if the white lights turn pink or red, he is approaching too low. If the red lights turn pink or white he is too high. He has plenty of time to get in the slot. Even with brilliant sunlight competing with the lights, they can be seen more than four miles away. FROM: *Time* magazine, Science Department.

"Living Light" Crystallized

The "living light" chemical, luciferin, which makes a glow-worm glow, has been crystallized from a glowing South Pacific fish known in Japan as kinme modoki, by a Princeton biologist and two Japanese colleagues.

Bioluminescence, sometimes called "living light" or "cold light," occurs in many marine dwellers, including luminous bacteria that may live in or on a fish, making a host appear luminescent. Glowing land dwellers include a spider found only in the High Sierras and a rare luminous beetle. Perhaps the weirdest creature of all is the "railroad worm" which has evenly spaced yellow lights down either side of its body and a red light out front.

Recent studies of luminescent systems in living organisms have clarified biological processes in general, Dr. Frank Harris Johnson, biology professor at Princeton, said. Changes in the intensity of "living light" emitted in response to variations in heat, cold, pressure and chemicals can be measured easily. Since the chemical processes of luminescence are basically similar to those that control reactions in living cells generally, their study has helped to show how other cells can be expected to behave in various circumstances. With pure luciferin now available, the same system can be studied under simpler, more easily controlled conditions than would be possible inside a living organism.

Citing one of the many examples, Dr. Johnson said experiments with luciferin, which reacts to enzymes, could indicate basic aspects of how human cells react to narcotics, anesthetics, analgesics and antibiotics. Dr. Johnson and Dr. Yata Haneda of Tokyo's Jikeika Medical College separated kinme modoki luciferin compound in 1957 in Japan . . . dissecting more than 4000 of the luminous organs, . . . crystallizing the pure chemical. FROM: *Science News Letter*, 78:343, November, 1960.

Light Source with 0.3- Microsecond Burst

A burst of light as fast as 0.3 microsecond is produced by a new light source for photographic motion studies designed by the Avco Research and Advanced Development Division in Wilmington, Mass. The high-intensity spark light was originally developed to study hypervelocity flights of advanced-design model nose cones for the Air Force Titan and Minuteman ICBMs on the Avco Ballistics Range.

The light source may be incorporated into instrumented shadowgraph and schlieren systems. In a basic shadowgraph system for laboratory work, the unit may be used alone in a manner similar to the open-shutter flash-bulb technique.

Four models are available to provide spark light duration from 0.3 to 1 microsecond. Size of the point light source varies from 0.015 to 0.060-inch diameter, depending upon the energy level which may range from 2 to 20 joules. The spark pulse may be synchronized with a Kerr Cell shutter. A voltage pulse is also produced to initiate other measuring devices.

The light source is a cylindrical package, called type LS-020, 12½ inches long by 5 inches in diameter, with a coaxial discharge path. The outer case serves as an r-f shield and once the unit is positioned, the component package may be removed, adjusted, and returned to the case without disturbing the optical alignment. The unit operates by discharging a coaxial capacitor in an air gap. FROM: *Electrical Engineering*.

(Continued from page 7A)

the Society's prestige, a more widespread dissemination of lighting information, the maintenance of member interest in the Society and the continued growth of IES. Specifically, the campaign is designed to further the image of the Society as a source of authoritative information and recommendations on lighting, focus attention on the National Technical Conference, further acceptance of IES Standards and Recommended Practices, publicize IES awards, elections and appointments and the activities of the IERI. The program will also be directed toward improvement of communications between the Society and its membership.

To implement the new program, Council has retained the firm of Raymond C. Mayer and Associates, Inc., New York, to work in association with the PR&I Committee and the IES staff. The Mayer organization, one of the oldest of its kind, is a specialist in public relations for engineering societies.

FOREIGN dignitaries on the Visual Aids Panel at the IES Aviation Committee's Fall Technical Conference included, left to right: J. B. de Boer, Philips Lamp Works, Eindhoven, Netherlands; Antoine Baldino, general engineer of air navigation, Paris, France; P. D. de Vries, Department of Civil Aviation, The Hague, Netherlands; Major Antonio Famalaro, Air Ministry, Rome, Italy; D. B. Fraser, Department of Civil Aviation, Melbourne, Australia. Other panel members not shown here were F. J. Steel, New Zealand; R. H. Clinkscales, Federal Aviation Agency, Washington, D. C. and C. A. Douglas, National Bureau of Standards, Washington, D. C.

"Outdoor Lighting" Magazine Begins Publication in March

Outdoor Lighting, a controlled-circulation magazine for street and other outdoor lighting engineers, has begun publication with a March, 1961, issue. M. C. Harsh of South Milwaukee, Wis., is the publisher.

The magazine will feature articles of general interest to outdoor lighting engineers plus departments devoted to digests of relevant IES papers, new products and personnel news. The proposed circulation of 9200 copies is to be divided among co-op managers and equipment specifiers (1760), public and private utilities and consultants (2800), highway engineers (1400), utility purchasing agents (830) and sales engineers (2500).

School Lighting Committee Reports Progress on New Guide

Work of the IES School Lighting Committee during 1960 was not reported in the General Secretary's Report (December 1960 IE). Very active work has, nevertheless, been underway by this committee, leading to a revision of the 1948 "American Standard Practice for School Lighting," hopefully within the coming six months.

Under the general chairmanship of John M. Chorlton, Toronto Board of Education, the work has been co-sponsored by IES, the American Institute of Architects, and by the National Council of Schoolhouse Construction. Further refinements and revisions in the proposed "Guide for School Lighting" were discussed at a meeting of the committee held at Columbus, Ohio, in December 1959. The hundreds of suggestions developing there have all been incorporated into a further draft, now being studied, together with the further suggestions of the IES Council. Work on the report is rapidly nearing completion, aiming for a final draft for Council study soon.

Aviation Committee Sponsors 2-Day Technical Conference

Over 80 representatives of industry and government attended the two-day Fall Technical Conference sponsored by the IES Aviation Lighting Committee. The conference, held December 8 and 9 in New York City, featured a full program of technical papers, inspection tours and a report on the landing visual aids panel of the International Civil Aviation Organization, held in Montreal during November.

Technical papers included a report on visual collision avoidance research by Wayne Howell, NAFEC; testing of visual glide slope indicators by Lt. Col. R. S. Griffith, U. S. Air Force; development of visual glide slope indicators in Australia by D. B. Fraser, Department of Civil Aviation, Melbourne; flight operational appraisal of approach and runway lighting by J. B. de Boer, Philips' Lamps Works, Eindhoven, Netherlands; and methods of simulating low visibilities for visual landing aids tests by Dr. R. K. McKelvey, psychologist, NAFEC.

Inspection tours of the newly completed downtown Manhattan Heliport and New York International Airport were preceded by talks on the lighting problems involved in these installations and the solutions employed.

Copies of the technical papers presented at the meeting are available on request to J. P. Hoxie, Recording Secretary, Aviation Committee, Corning Glass Works, Corning, N. Y.

Hotel Design Firm Plans Promotion of Good Lighting

As a result of an 18-state survey which indicated that lighting is the most neglected area of hotel/motel guest room design, the Ballard Corp., a hotel/motel design organization, has inaugurated a program to promote better lighting in hotels. In their future designs the company will aim for a minimum of 10 footcandles of general lighting in guest rooms, with 30 footcandles for reading, writing and grooming.

Joseph Sebastiana, design supervisor of Ballard, attributes the deficiency in hotel lighting to the hotel industry's be-

(Continued on page 12A)

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Never before in lighting history has there been such an offering as the new line of APPLETON floodlights. Each individual unit represents the latest in engineering . . . performance-proved in APPLETON's own laboratories. Not just one model, but *every* model incorporates the finest in design, the finest in construction, the greatest number of built in features and the greatest possible lighting efficiency. Before specifying floodlights for your next installation, check APPLETON.

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Installations in the News...

Mercury Relights Bronx-Whitestone Bridge

The Bronx-Whitestone Bridge, across the East River in New York City, was relighted to an average maintained level of 1.7 footcandles from a system of twin-mounted mercury luminaires. The 400-watt mercury units, mounted 24 feet above the roadway on existing poles spaced 100 feet apart on a center mall, supply four times as much light as the filament units they replaced with only a 25 per cent increase in load. Installation of regulator ballasts made it unnecessary to change feeder size or existing circuit breakers.

The bridge, which connects the Bronx and Queens, has a 2300-foot span and six traffic lanes. It carries more than 20,000,000 vehicles annually. Photo and data courtesy of General Electric Co., Schenectady, N. Y.

(*Continued from page 9A*)

lief that good lighting will result from the allotment of a specified amount of wattage per room. To correct this erroneous assumption, Mr. Sebastiana believes, the hotel industry must be educated, initially, to the need for professional design of lighting systems, systematic maintenance to insure optimum benefit from the lighting investment and the folly of purchasing cheap equipment, inadequate to the rigors of institutional use.

Nominations Submitted for 1961-62 IES Officers

At its meeting on February 9, IES Council approved the following slate for new officers for 1961-1962, on recommendation of the Nominating Committee:

President—James R. Chambers, Appleton Electric Co., Chicago, Ill.

Vice-President (two-year term)—J. Dixon Mitchell, Westinghouse Lamp Division, Chamblee, Ga.

General Secretary (one-year term)—Charles L. Amick, Day-Brite Lighting, Inc., St. Louis, Mo.

Treasurer (one-year term)—Arthur C. Barr, General Electric Co., Cleveland, Ohio.

Director (three-year term)—John M. Chorlton, Toronto Board of Education, Toronto, Ont.

Director (three-year term)—William P. Lowell, Jr., Sylvania Electric Products Inc., Salem, Mass.

Regional Vice-Presidents nominated to fill five expiring two-year terms were:

Canadian Region—John P. R. Cristel, The Shawinigan Water & Power Co., Montreal, Que.

East Central Region—S. J. Ragland, Virginia Electric & Power Co., Richmond, Va.

Inter-Mountain Region—Robert W. Godemann, Arizona Public Service Co., Phoenix, Ariz.

Southeastern Region—T. Llewelyn Cordle, J. N. Pease & Co., Charlotte, N. C.

Southwestern Region—R. G. Turpin, Sylvania Electric Products Inc., Dallas, Texas.

Continuing his two-year term for another year will be G. Franklin Dean, Toronto Hydro-Electric System, First Vice-President.

Portable Ultraviolet Meter Developed

A direct-reading meter for the measurement of direct or reflected ultraviolet radiation has been developed by engineers of the Westinghouse Lamp Division, Bloomfield, N. J. The meter is compact and portable, weighing only 5½ pounds, and requires no external power source. The batteries are the only parts in the instrument which require replacement.

Calibrated in microwatts per square centimeter, the meter measures the intensity of ultraviolet in the 2537A range, which includes germicidal lamps used in hospitals and air purification units. It may be used to measure the intensity of ultraviolet installations and to determine whether ultraviolet lamps in use are still effective.

'58-'60 Rise in Engineers' Salaries Lags Behind Previous 5-Year Rate

From mid-1958 to mid-1960, engineering salary levels showed a 5 per cent annual increase, to an over-all median of $9600, in comparison with an average annual increase of 6½ per cent between 1953 and 1958. During the 1958-1960 period, the Consumer Price Index rose 2.3 per cent and average gross weekly earning for production (manufacturing) increased 8.9 per cent.

These statistics were reported in the fourth of a series of surveys, "Professional Income of Engineers—1960," conducted by the Engineering Manpower Commission. The surveys, which covered approximately 200,000 engineering graduates in industry, education and government service (about a quarter of the engineering work force), also revealed that salaries increase more rapidly during the early years of employment and taper off after 20 years of experience. In recent years, however, this latter trend has become less pronounced.

A substantial difference was reported among engineering salaries in industry, government and education, with the highest level found in industry and the lowest in government service. A 14.3 per cent rise in the total professional income

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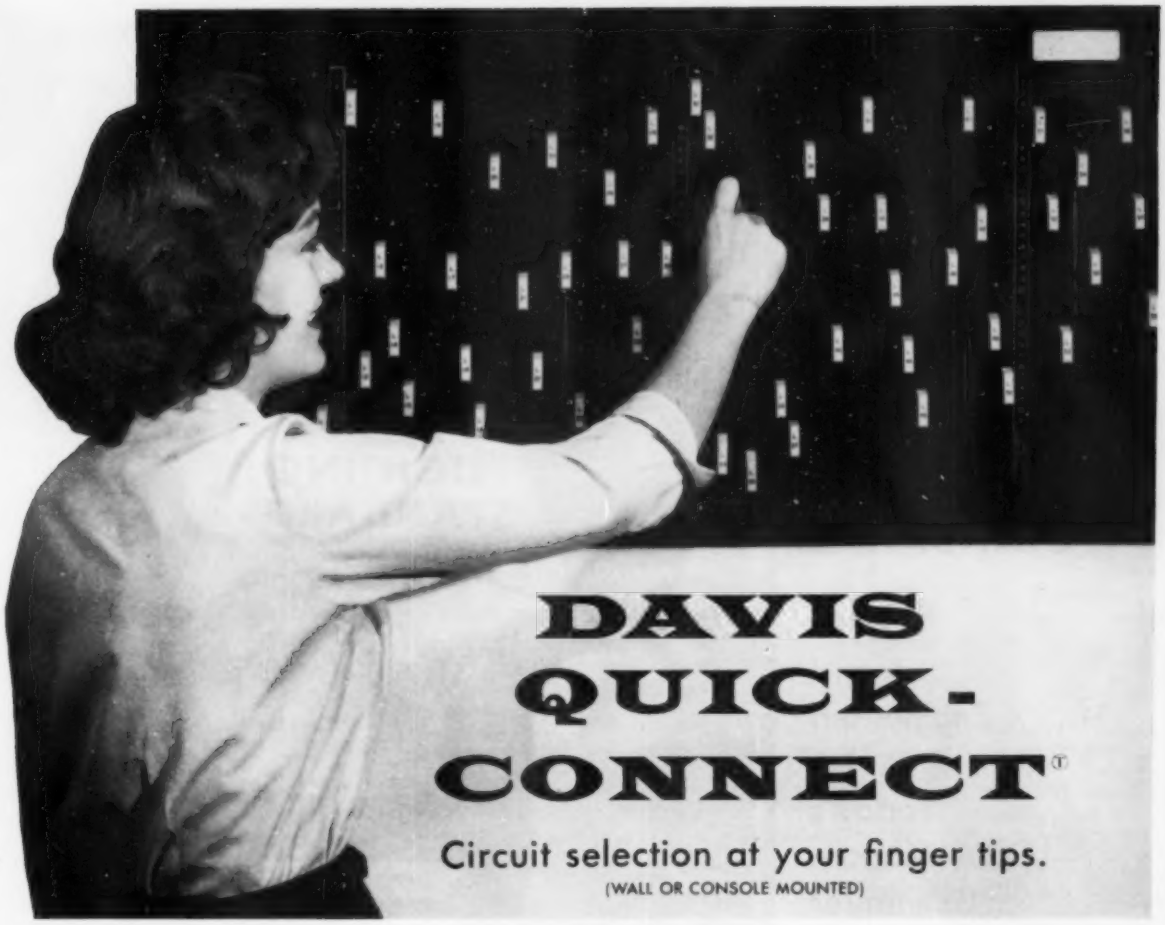

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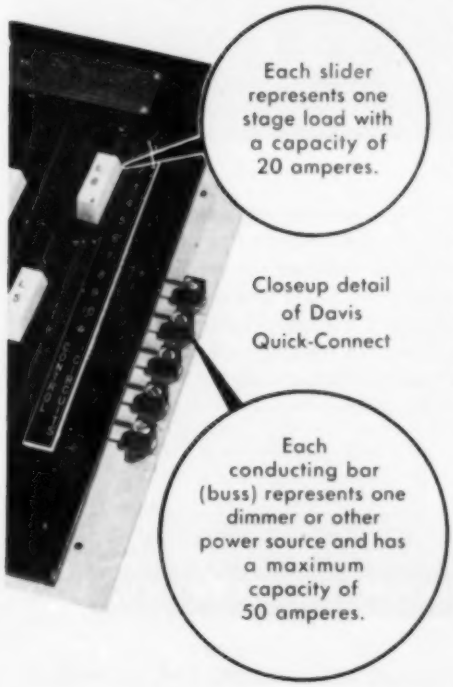
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Closeup detail of Davis Quick-Connect
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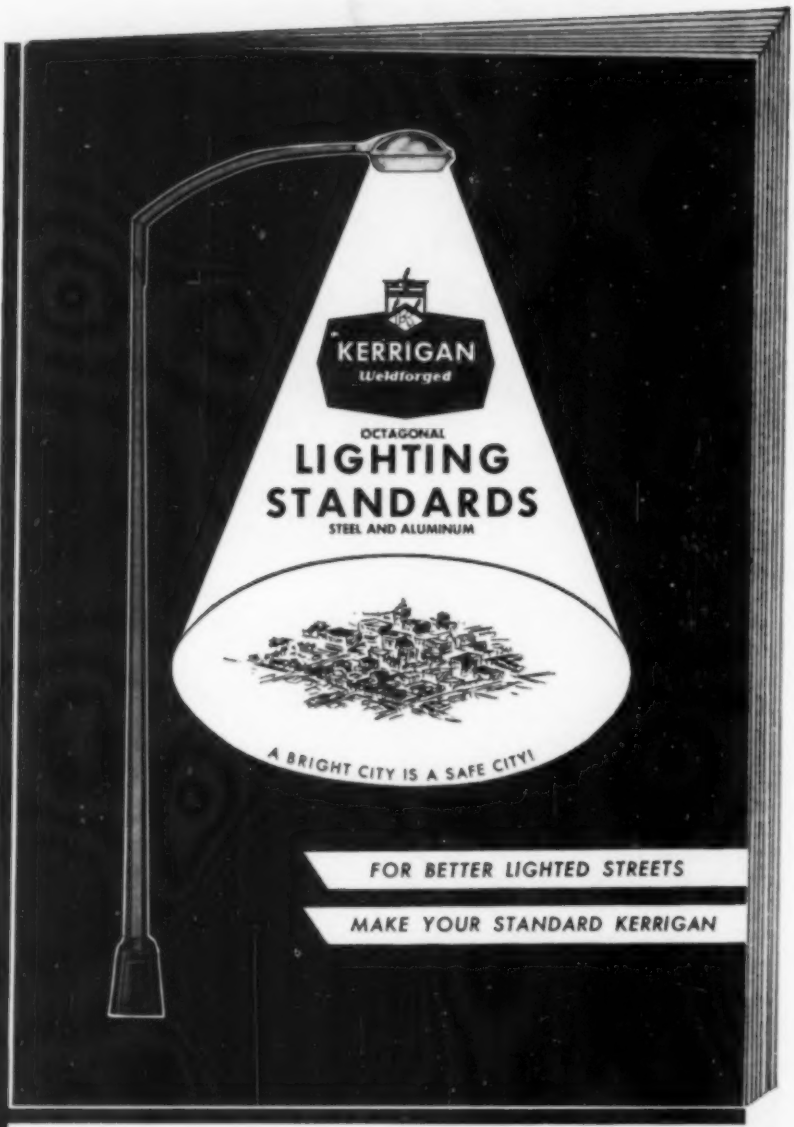

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(*Continued from page 12A*)

of engineering teachers between 1958 and 1960 is of particular note.

The survey report is divided into separate sections for 22 subdivisions of industry, with separate curves for Ph.D., Sc.D. and M.S. graduates, federal, state and local government service and college and technical institute teaching. Copies of the report are available from the Engineering Manpower Commission, 29 West 39th St., New York 18, N. Y., at $3 per copy.

New York City Limits Plastic Luminous Areas

The City of New York's Department of Water Supply, Gas and Electricity has recently ruled that no more than 30 per cent of a ceiling area or 20 per cent of a wall area may consist of plastic light diffuser panels. The ruling is described in Bulletin No. 13 which also classifies permissible plastics and notes procedures for approval. The two-page mimeographed bulletin is available from the Chief Engineer, Department of Water Supply, Gas and Electricity, Municipal Building, New York, N. Y.

National Engineers' Association Announces Decision to Disband

Officers of the Engineers and Scientists of America, a national collective bargaining association for the engineering profession, have announced that the organization will be disbanded. The decertification of Western Electric engineers last June and the recent decision by RCA engineers to disaffiliate from the organization have reduced the size of the ESA to a point where it is ineffective on a national level. The association attributes its dissolution to a lack of unity of goals on a national scale and the absence of a feeling of "brotherhood" among engineers.

The ESA was an outgrowth of the postwar development of engineers' unions at major engineering companies, among them Boeing, Lockheed, Douglas, RCA, Western Electric, Standard Oil of Indiana, Sperry, Arma, Minneapolis-Honeywell and Shell Oil. The 1949 organization of the National Professional Association of Engineers, Architects and Scientists on the West Coast and the Council for Engineering and Scientific Employees on the East Coast and the amalgamation of the two groups into the ESA were attempts at forming national collective bargaining organizations.

(*Continued on page 16A*)

SCHEDULED EVENTS

1961 Dates of Interest to IES Members

April

April 8-15—Electrical Home Show, War Memorial Building, Rochester, N. Y.

April 10-11—East Central Regional Conference, IES, Benjamin Franklin Hotel, Philadelphia, Pa.

April 10-12—Inter-Society Color Council, Annual Meeting, Sheraton Hotel, Rochester, N. Y.

April 17-18—Southwestern Regional Conference, IES, Skirvin Hotel, Oklahoma City, Okla.

April 20-21—Southeastern/South Central Regional Conference, IES, Biltmore Hotel, Atlanta, Ga.

April 23-28—American Institute of Architects, Annual Convention, Philadelphia, Pa.

April 29-May 3—National Association of Electrical Distributors, Annual Convention, Detroit, Mich.

April 30-May 4—Electrochemical Society Meeting, Claypool Hotel, Indianapolis, Ind.

May

May 1-2—Intermountain Regional Conference, IES, Salt Lake City, Utah.

May 1-3—American Institute of Electrical Engineers, Rural Electrification Conference, Kentucky Hotel, Louisville, Ky.

May 2-4—Electric Association of Chicago, Sixth Biennial Midwest Electrical Industry and Lighting Exposition, McCormick Place, Chicago, Ill.

May 4-5—South Pacific Coast Regional Conference, IES, Sacramento Inn, Sacramento, Calif.

May 8-9—Pacific Northwest Regional Conference, IES, Harrison Hot Springs, Harrison, B. C.

May 15-16—Canadian Regional Conference, IES, Queen Elizabeth Hotel, Montreal, Que.

May 15-17—Building Research Institute Conference, Shoreham Hotel, Washington, D. C.

May 22-25—Design Engineering Show, Cobo Hall, Detroit, Mich.

June

June 2-3—Maritime IES Conference, Moncton, N. B.

June 5-7—Edison Electric Institute, Annual Convention, New York, N. Y.

June 5-9—Society of the Plastics Industry, National Conference, Commodore Hotel, New York, N. Y.

June 7—IES Council Meeting, Barbizon Plaza Hotel, New York, N. Y. Members are invited to attend meetings as guests of Council.

June 8-9—Northeastern Regional Conference, IES, Berkeley-Carteret Hotel, Asbury Park, N. J.

June 18-23—American Institute of Electrical Engineers, Summer General Meeting, Ithaca, N. Y.

June 19-20—Great Lakes Regional Conference, IES, Sheraton-Gibson Hotel, Cincinnati, Ohio.

June 26-28—American Society of Heating, Refrigerating and Air Conditioning Engineers, Annual Meeting, Denver-Hilton Hotel, Denver, Colo.

July

July 4-7—National Society of Professional Engineers, Annual Meeting, Olympic Hotel, Seattle, Wash.

July 18-20—Western Plant Maintenance Show, Pan Pacific Auditorium, Los Angeles, Calif.

August

August 21-23—National Association of Lighting Maintenance Contractors, National Convention, Flamingo Hotel, Las Vegas, Nev.

September

September 12-15—Industrial Building Exposition, New York City Coliseum, New York, N. Y.

September 14-15—Engineering Management Meeting, sponsored by AIEE and ASME, Hotel Roosevelt, New York, N. Y.

September 24-29—Illuminating Engineering Society, National Technical Conference, Chase-Park Plaza Hotel, St. Louis, Mo.

October

October 4-6—Canadian Electrical Manufacturers Association, Annual Meeting, Sheraton-Brock Hotel, Niagara Falls, Ont.

October 4-6—International Association of Electrical Leagues, Annual Conference, President Hotel, Atlantic City, N. J.

October 9-14—National Electrical Contractors Association, Annual Convention, Washington, D. C.

October 10-12—American Standards Association, National Conference on Standards, Rice Hotel, Houston, Texas.

(*Continued from page* 15A)

The ESA had difficulties from its inception, as a result of the division between member groups representing engineers and technicians and groups representing only engineers. A loose affiliation of the two kinds of groups failed after several years and the mixed groups disaffiliated from the purely professional half of the ESA. Following this fragmentation, the organization lost strength until the actions of the Western Electric and RCA engineers forced it to disband.

EEI Launches Program to "Farm Better Electrically"

Two-page spreads, scheduled for the April issues of five leading farm magazines, will launch the Edison Electric Institute's "Farm Better Electrically" program, a nationwide advertising and promotion campaign designed to increase the efficient use of electricity on the farm Following the initial spreads, single-page ads in the magazines throughout the remainder of 1961 and local "All-Electric Farm" programs will be used to develop the campaign.

The ads will be planned around the theme of "8 cents worth of electricity will do 8 dollars worth of muscle work." Photographs taken on actual farms and copy based on interviews with farmers will be used in the ads.

In 1959 farmers spent $26 billion in materials and services for further production, investing almost $21,000 per worker, $3000 more than was invested for the average industrial worker. In view of the farmer's need to keep costs down, the "Farm Better Electrically" program will be directed toward solving this problem through the efficient use of electricity and electrical automation.

Stevens Institute Requires Writing Course for Engineers

The *American Engineer* reports the fresh approach taken by Stevens Institute of Technology toward solving the problem of inarticulate scientists and engineers. Everybody talks about the professional man's inability to tell others precisely what's on his mind, but up to now nobody has done much about it. Stevens has established a required freshman writing course that cuts beneath the superficial answers of more grammar and increased vocabulary. The course, said to be the first of its kind in an engineering college, requires students to recognize how much their attitudes and prejudices have shaped their awareness of things

(*Continued on page* 21A)

It Seems to Me . . .

Lighting Allies

I certainly agree with . . . Gladys Miller's comments on "A Plea for Coordination of Lighting Allies" published in the December 1960 issue of ILLUMINATING ENGINEERING.

. . . There is one group in the industry that is doing something about the problem. It is the National Association of Lighting Maintenance Contractors. Relamping with the correct lamp, or the lamp for which the system was designed, is one of their main talking points. These firms carry their lamps in their own stocks, and sell their services to their customers.

The problem with NALMCO, of course, is that there are only about 100 members in their group across the whole country. Also, their customers are primarily industrial and commercial firms—not home owners. So the big problem still exists just as Miss Miller has outlined it.—BERLON C. COOPER, Associate Editor, *Electrical Construction and Maintenance,* McGraw-Hill Publishing Co., New York City.

I was glad to see that others are concerned with the problems of maintenance described [by Gladys Miller's article in December IE]. For years in our local section of IES, and I might add, at some sectional and national committees, I felt like a lone voice crying out for much of what she described.

I went a step further with respect to fluorescent lamps, for example. Not only do I advise designers, architects, engineers and all others involved in lighting design to be sure to check materials to be used in a particular area with the actual light source that will finally be used, to insure a color rendition that it desired and is most pleasant, but I have urged a standardization of such fluorescent light sources by the lamp companies. . . . The lamp companies have achieved a reasonable standardization for the standard cool white lamp. However, in most installations I recommend either a deluxe cool white or deluxe warm white fluorescent lamp. The problem arises in that a deluxe cool white lamp of one company . . . is noticeably different from the similarly designated lamp of the other companies. The result is that even if deluxe fluorescent lamps are later replaced, there is no assurance that the color renditions will be the same as the initial installations—which may have been most carefully designed.

With respect to fluorescent lamps, I find that the distributor salesman for the most part is unaware of the existence of lamps other than standard cool white, and the result that can be achieved in terms of color and esthetic effects with the proper lamp. This ignorance extends even to the heads of electrical distributor firms. I believe that IES certainly has the responsibility in that its basic By-laws speak of its function being the dissemination of the art of illumination to the general public. I further feel that we members have a responsibility to stimulate a liking and knowledge of lighting that can have the effect on those in the business to take action that will resolve the problem Miss Millller cites. A fundamental problem is, of course, that in this business we have a minority of idealists. The bulk of the people are merchandisers who have no love for lighting but feel that this is merely a way of making money. . . . A. A. Fox, Manufacturers' Representative, Washington, D. C.

STARAMA

STARAMA

NEW,

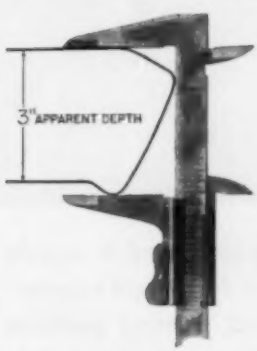
STARAMA

ALL PLASTIC

SHIELDED

LUMINAIRES

Go modern fast and easy. Specify and install the new wafer-thin, surface-mounted QPCX7400 Sunbeam Visionaires®. A handsome, wrap-around plastic enclosure gives the fixture a semi-recessed look. The diffuser is completely reinforced in metal and may be opened from either side. Exclusive Sunlux® bottom lens panel assures long lasting luminaire efficiency. No "hardware" mars the clean styling.



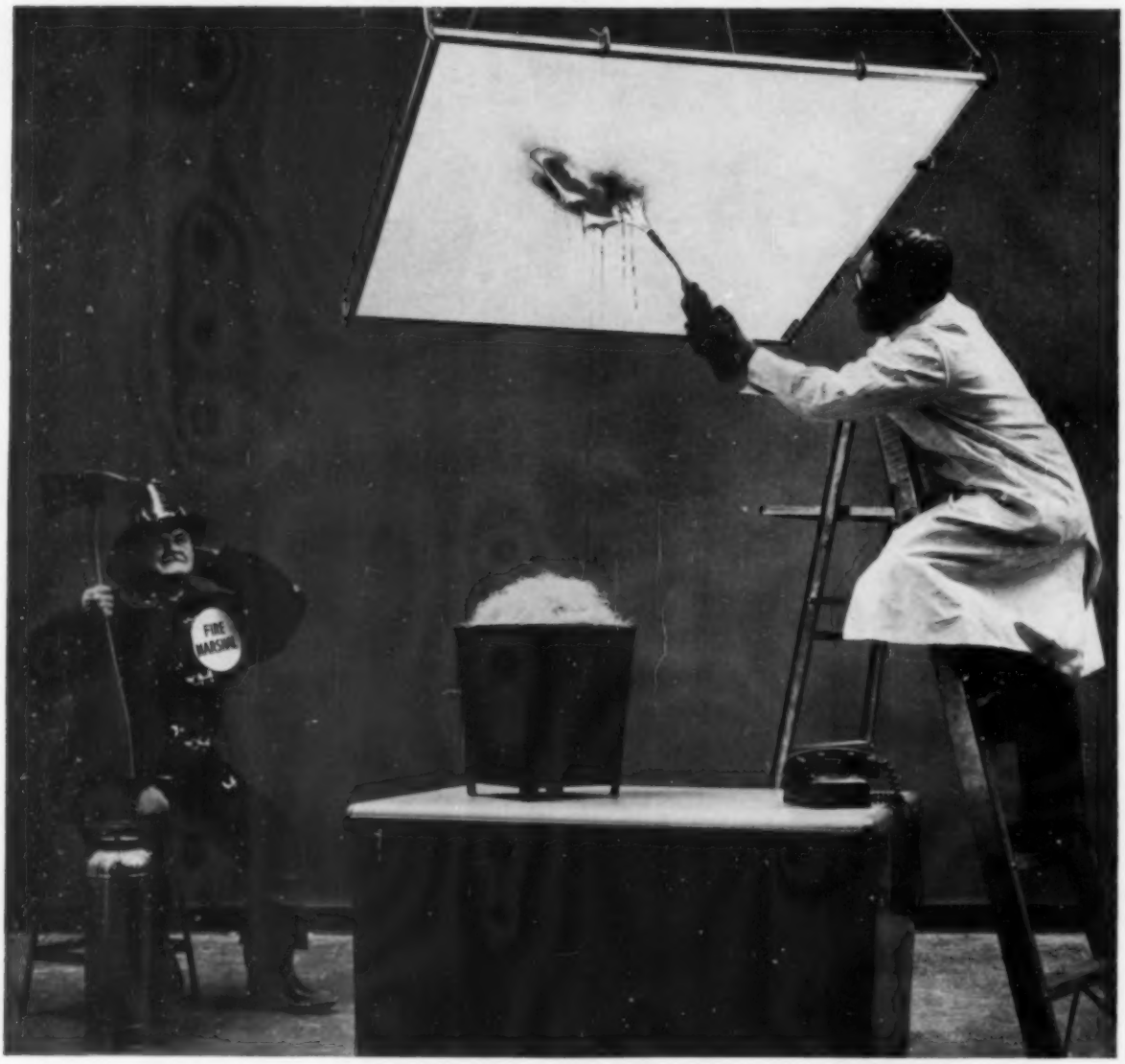
write for bulletin A841

SUNBEAM LIGHTING COMPANY LOS ANGELES, CALIFORNIA GARY, INDIANA

Sheffield announces FIRST

Self-Extinguishing †

Impact-Styrene Sheet



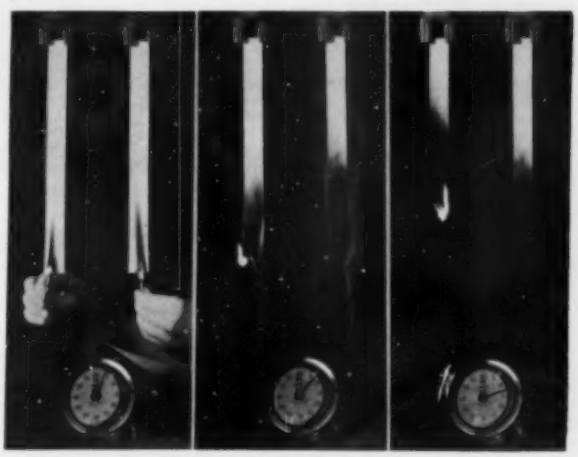
† New FROST-WHITE-SE* grade sheet is guaranteed to puzzle even the most knowledgeable fire marshal. No heroic countermeasures are required either, since melted, flaming particles extinguish themselves long before reaching any flammable materials below.

*Trade Mark. Sheffield Plastics, Inc.

New FROST-WHITE-SE Styrene Sheet Overcomes Major Problems of All-Plastic Ceilings

Now you can take advantage of the superior performance of vacuum-formed styrene sheet or pans for installations where the plastic covers most of the ceiling. Sheffield Plastics' new FROST-WHITE-SE styrene sheet not only meets the N. Y. C. building code self-extinguishing requirements, but overcomes the problems of premature discoloration and lack of rigidity of vinyl sheet now so widely used. Its characteristics include:

- ***SELF EXTINGUISHING*** — Passes N. Y. C. Building Code, Group A, Underwriters' Test Lab, Group 2 and ASTM Test D-568-56T, can thus be used in all-plastic ceiling installations.
- ***COLOR STABLE*** — Retains its original blue-white color up to 50,000 lighting hours — more than 3 times as long as vinyl sheet or pans.
- ***BREAK RESISTANT*** — Withstands severe impact and can be twisted as much as 180° without breaking. Cuts breakage in handling and shipping.
- ***EFFICIENT*** — Has high light transmission (up to 60%) in sheet thickness of 0.025". Increased thickness, compared to 0.015 or 0.020" thick vinyl sheet simplifies handling and installation.



Test of regular styrene at left vs. new FROST-WHITE-SE styrene at right using method similar to A.S.T.M. method D-568-56T. Note flaming vs. self-extinguished styrene particles around clock in photos 2 and 3.

NOW AVAILABLE in volume production, FROST-WHITE-SE styrene sheet is readily processed by vacuum formers in shapes to meet your installation requirements. Sheffield, of course, produces only the sheet in thicknesses of 0.025 and 0.040 inches.

TECHNICAL DATA AND PRICES OF FROST-WHITE-SE styrene sheet are readily available. Address your requests to the nearest Sheffield sales office or to Sheffield Plastics, Inc., Dept. 14-B, Sheffield, Massachusetts.

First in Plastics for Lighting

SHEFFIELD PLASTICS, INC.

SHEFFIELD, MASS.

SALES OFFICES

New York, N. Y. LO 8-3760 • Drexel Hill, Philadelphia MA 6-4762

Chicago, Bill Brown Sales Co., Inc. IR 8-8980 • San Francisco, Courtney Associates JU 5-5010

Even if you ripped out half your fixtures...

you'd still get more light with Sylvania VHO Powertubes!

Or you could get *2½ times more* light with the same number of fixtures you now have! Sylvania VHO (Very High Output) Powertubes are that much brighter than standard fluorescents. Yet they're only 1½" in diameter. Light in weight. Easy to maintain (smooth *tubular* surface doesn't have nooks and crannies to catch dust which dims light).

And every one comes with this exclusive *money-back guarantee:* "If at any time a Sylvania Fluorescent Lamp fails in your opinion to provide better performance than any other brand fluorescent lamps, on the basis of uniformity of performance, uniformity of appearance, maintained brightness and life, it may be returned to the supplier for full refund of purchase price."

Only Sylvania gives you this Certified Performance Policy. It's your assurance of lowest TCL (Total Cost of Lighting), which means cost of lamps *plus* power *plus* maintenance. Get the pluses Sylvania offers. Call your representative now. Or write Lighting Division, Sylvania Electric Products Inc., Dept. 61, 60 Boston St., Salem, Mass. In Canada: Sylvania Electric (Canada) Ltd., Montreal.

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

(*Continued from page* 16A)

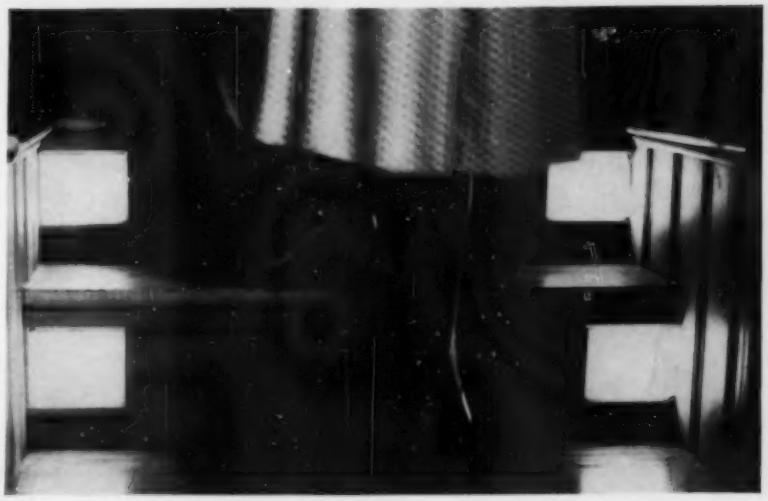
around them, whether they are writing about their adjustment to college life, a Van Gogh painting or Einstein's theory of relativity. The same method used in science and engineering is applied to writing. The students learn that men like Einstein and Newton first had to structure their own thoughts and to decide on a point of view, before they could express order in the physical universe. Several students have already reported that the course helped them in solving physics problems.

Circular Slide Rule Free to IE Readers

General Industrial Co. is offering a simplified circular slide rule free to engineers and other plant and office executives. Operation of the pocket-size calculator is simple and results are accurate. Complete easy-to-follow instructions for multiplication, division and finding proportions are included with each slide rule.

To obtain a free circular slide rule, a request, on business letterhead, should be sent to the General Industrial Co., 1788J Montrose Ave., Chicago 13, Ill., mentioning IE as the source of information. Those who do not qualify as engineers or business executives may obtain a slide rule for 50 cents.

Installations in the News . . .



Electroluminescence Applied in Stairway Safety Light

The electroluminescent safety lighting units installed on this stairway are 4-by 8-by ½-inch fixtures composed of a flat panel and simple metal frame, fastening nearly flush with existing stair risers. In comparison with the standard bulkier stairway safety unit (steel box, louver, socket and lamp) which requires extensive installation procedures, this device is easily mounted on existing stairways with little or no carpentry work or alterations needed.

The safety light, in yellow or green, has an estimated life of 10,000 hours, operates on 120-or 240-volt a-c and consumes only one watt of electricity. Photo and data courtesy Westinghouse Lamp Division, Bloomfield, N. J.

New Standard of Length Now Tied to Light Wave

The inch, for more than 70 years defined as a certain fraction of the length of a platinum iridium meter bar stored in Paris, now has a new definition. As a result of action taken by the 11th General Conference of Weights and Measures, which met in Paris in October 1960, the world adopted a new standard of length—a wavelength of light—replacing the meter bar. New definition of the meter is 1,650,763.73 wavelengths of the orange-red line of krypton 86.

Since the wavelength of a specific kind of light is thought to be unchanging, adoption of the new length standard removes uncertainties about the stability of the primary standard, which had always accompanied use of a standard bar. Also, it will no longer be necessary for national standards organizations to calibrate their length standards against the Paris bar; the new standard is reproducible to great accuracy in any properly equipped laboratory. Some length measurements can now be made more accurately in terms of the new definition.

The meter bars which have served as standards of length throughout the world for over 70 years will not be discarded or placed in museums because of this decision, the Conference said. They will remain important because of the ease with which they can be used for certain types of measurement. The new definition of the meter will not materially change the measurement of length nor in any way the relation between the English and metric units. Careful experiments performed at the National Bureau of Standards immediately prior to the meeting of the Conference confirmed that the wavelength standard and the metal standard are in satisfactory agreement. The inch now becomes equal to 41,929.399 wavelengths of the krypton light.

Similar measurements performed by the National Research Council in Canada, according to the *Magazine of Standards* (ASA), are in substantial agreement with the National Bureau of Standards results. They all show that the distance from a point in New York to a point in Washington would be altered by less than three inches, as measured in terms of the old metal standard and the new wavelength standard. However, by adoption of the new definition, the standard of length which has been used by spectroscopists for the past 50 years is brought into agreement with that used in other branches of science, thus increasing the unification of systems of measurement throughout the scientific world. Although the conferees recognized that the new definition may have the effect of shortening the meter, the amount of shortening will be less than 1/5000th part of the thickness of a dime.

New Building Research Projects Announced by University of Illinois

Two research projects, one to involve the design and re-evaluation of components for residential construction, the other a field investigation of electrically-heated houses, will be conducted by the Small Homes Council—Building Research Council of the University of Illinois. The studies are the result of two grants recently made to the University.

(*Continued on page* 24A)

Another **NEW** General Electric Ballast Development . . .

THIS CAPACITOR IS DESIGNED TO PREVENT RUPTURE!

New Thermal Link deep within capacitor roll protects against excessive internal temperatures which may cause rupture of the capacitor case. Also, a new bushing assembly acts as an effective barrier to seal against bushing seepage. Result: longer ballast life.

Introducing

NEW GENERAL ELECTRIC *Bonus Line*

Fluorescent Ballasts

DESIGNED TO...

- eliminate hazards to people and property
- eliminate need for individual ballast fusing
- eliminate leakage
- provide longer ballast life
- be interchangeable with standard models

WITH NO SACRIFICE IN SOUND PERFORMANCE!

Another NEW General Electric
Ballast Development . . .
SPECIAL THERMAL PROTECTOR
makes ballasts safer
than ever before!
Unique Thermal Protector is designed to de-energize the ballast *permanently* at end-of-life failure, preventing compound softening and eliminating ballast leakage. This assures full-life protection against hazards to people or property.

General Electric proudly announces new Bonus Line fluorescent ballasts, designed to offer you—for the first time—full protection against the hazards sometimes associated with ballast end-of-life failure.

This new ballast design, *available in most popular ratings for indoor commercial and industrial applications*, features two outstanding new General Electric developments that make it safer than standard ballast designs:

1. A new Thermal Protector has been developed and tested for several years in General Electric laboratories. The Thermal Protector de-energizes the ballast before it reaches the critical internal temperatures at end of life that cause ballast filling compound to soften or melt. This non-resetting Thermal Protector completely eliminates any need for individual ballast fusing.
2. A newly developed, two-way improved General Electric capacitor features a unique Thermal Link designed to overcome capacitor rupture and leakage which sometimes occur at end of life. Also, the new capacitor has a new bushing assembly which contributes to longer ballast life.

New Bonus Line ballasts are dimensionally, thermally, and electrically interchangeable with standard General Electric ballasts of same ratings. They meet—*and, in certain respects, exceed*—all appropriate industry standards. And you get all these ballast added values without sacrifice in sound performance. General Electric ballasts are still the quietest ballasts available!

In short, new G-E Bonus Line ballasts give you added years of safe, reliable, quiet performance. They're engineered to eliminate leakage, smoke—even the more violent conditions which sometimes occur at end of normal ballast life.

Your General Electric ballast sales engineer will be proud to give you full information on new G-E Bonus Line ballasts for your lighting applications. Contact your nearby G-E sales office or write for Bulletin GEA-6912 to Section 403-01, General Electric Co., Danville, Illinois.

Progress Is Our Most Important Product

GENERAL ELECTRIC

(*Continued from page 21A*)

The component study is being underwritten by Lumber Dealers Research Council, and the heating study by Commonwealth Edison Co. of Chicago. This latter study will attempt to develop information on the relationship of the amount of electricity actually used to heat the home with calculated estimates for the same home. Ten houses will be used.

Plastics in Buildings Conference, April 20, Springfield, Mass.

A technical conference on "Plastics, A New Dimension in Buildings," is being held on April 20, 1961, in Springfield, Mass., under the sponsorship of the Western New England Section of the Society of Plastics Engineers, Inc. The conference, which will take place at the Springfield Museum of Fine Arts, has been planned to coincide with the first showing of a travelling educational exhibit demonstrating the application of plastics in modern architecture and construction. Keynote speaker will be Harold Horowitz, assistant director for technical programs, Building Research Institute.

The technical conference program, developed in cooperation with the Plastics in Buildings Activity Group of the SPE, features papers on plastics in building exteriors, the importance of structural and dimensional stability of plastics materials, resistance to weathering, thermal insulation and plastics in lighting application. A conference preprint book including copies of all papers presented at the technical sessions at Springfield, as well as additional papers on other aspects of the subject, will be available.

Advance registration fees are $11 for SPE members, $12 for all others. An additional $1 fee will be charged at the Conference. Advance registrations should be sent to Blakely R. McNeil, RETEC Registration Chairman, Fuller Brush Co., Hartford 15, Conn.

Obituary

Louis F. Heckmann, vice-president in charge of sales for the Union Metal Manufacturing Co., Canton, Ohio, died of a heart attack on January 14 at the age of 63.

Mr. Heckmann had been affiliated with Union Metal since 1937, serving as manager of street lighting sales, assistant general sales manager and general sales manager before he was appointed to the vice-presidential position in 1959. Prior to joining Union Metal, he had been manager of street lighting sales for Westinghouse Electric Corp.

L. F. Heckmann

An IES member since 1920, Mr. Heckmann served as vice-chairman and secretary of the Roadway Committee, member of the Committee and several of its subcommittees for many years, member of the National Technical Conference Committee and discussion organizer at several National Technical Conferences. In addition to his work for IES, he was an active member of the National Electrical Manufacturers Association.

Mr. Heckmann attended the University of Illinois and the Carnegie Institute of Technology.

25 YEARS AGO

1,000,001st IES Certified Lamp

The first of the second million of IES certified lamps, a special design of Brazilian Onyx trimmed with 24-karat gold plate was presented to A. W. Robertson, chairman of the board of the Westinghouse Electric & Manufacturing Co. in honor of the company's golden jubilee. The certified lamp program, established in 1934 as a result of a survey which showed "an alarming prevalence of defective eyesight among students," was credited with having educated the general public to the need for adequate seeing facilities.

A reprint of an editorial from *United Business Service* in the February, 1936 issue of the *Transactions* recounts the experiences of a skeptical advertising man with the certified lamp. After having been told by one lamp salesman that the IES lamp had made all other study lamp designs obsolete, the wary buyer did some comparison shopping and discovered that the certification, rather than being an advertising gimmick was a guarantee of good construction, good design and proper optical qualities, backed by a technical society, the Better-Light-Better-Sight Bureau and the Electrical Testing Laboratories. Needless to say, he bought an IES lamp and expressed the wish that more products could be purchased with the same quality assurance.

IES Women's Auxiliary

The January, 1936 issue of the *Transactions of the Illuminating Engineering Society* reports on the successful first year of operation of the Women's Auxiliary of the Chicago Section of IES. Under the leadership of Caroline Whittemore, the first local group of what is now a highly successful national Residential Lighting Forum program was organized to serve the needs of women in the lighting industry and to bring the story of good lighting to the homemaker.

Membership in the Chicago Auxiliary for the first year was 40, with dues of two dollars per month. The members received monthly reviews of home lighting articles prepared by Miss Whittemore and her committee. At the time of the report in the *Transactions*, the success of the Chicago group had prompted the organization of the New York Auxiliary under the chairmanship of Lillian Eddy.

While the Women's Auxiliaries were formed in recognition of the entry of women into the lighting field, today's Residential Lighting Forums boast a sizeable male membership, with many of the men serving as Forum Chairman. Membership in the Forums for 1959-1960 was 911, with 13 Forums in active operation. Total meeting attendance was almost 4000. The National Forum Committee sponsors a session at the National Technical Conference each year and individual Forums engage in many community activities designed to promote good lighting.

250-Watt Mercury Lamp Introduced

Following the popular acceptance of the 400-watt mercury vapor lamp introduced in 1934, the Mazda lamp manufacturers, in 1936, introduced a 250-watt mercury source with a rated efficiency of 30 lumens per watt. The lamp was said to produce 7500 lumens and have an average rated life of 2000 hours. Over-all length of the source was 8 inches and it was recommended for use in any existing equipment of the enclosed type.

Today, 250-watt clear mercury lamps of three major manufacturers are rated at 44 lumens per watt, produce more than 11,000 lumens and have an average rated life of 12,000 hours. Their over-all length now averages a little over 8 inches.

(*News continued on page 26A*)

Just published...

NEW BROCHURE

shows how Glass can be engineered to solve specific design problems

Twenty colorful pages describe the Kopp Glass engineering service; showing how the properties of glass are controlled and combined to provide designers and manufacturers with specialized, custom-produced products that meet specific application requirements. This includes analyzing the application, developing the formula, designing the mold and establishing manufacturing procedures.

A few examples shown include street and highway traffic control lenses; aviation, marine and railroad signaling lenses; dental and surgical lighting filters; street and interior lighting glassware; floodlight cover glasses; industrial globes and indicator lenses; theatrical and exterior lighting color filters.

Send this coupon for your FREE copy ▼

EDN

Kopp Glass, Inc.
Swissvale, Pa.

Please send copy of "This is Kopp Glass"

NAME_____

COMPANY_____ TITLE_____

ADDRESS_____

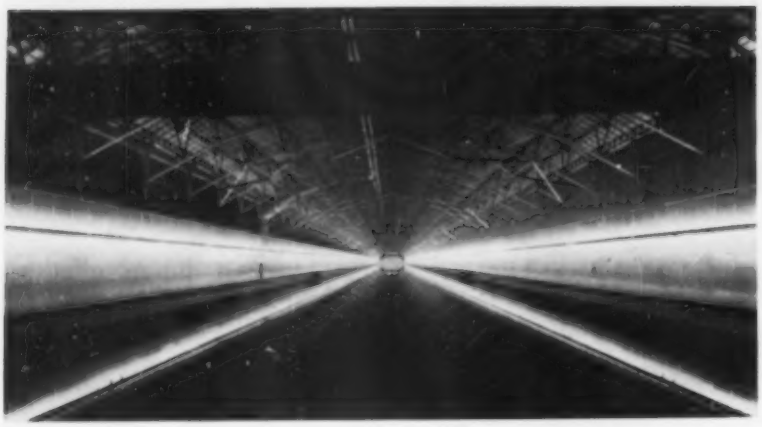
CITY_____ STATE_____

KOPP GLASS

Kopp Glass, INC.
Swissvale, Pennsylvania

MANUFACTURERS OF MOLDED INDUSTRIAL AND SIGNAL GLASSWARE

Installations in the News . . .



Cold Cathode Tubes Light British Ship Testing Tank

The longest ship testing tank in Europe, a 1200-foot long by 48-foot wide tank at the Hydrodynamics Laboratory in Feltham, England, is lighted by 2400 feet of cold cathode tubing installed along the sides of the tank and mounted on specially designed aluminum trunking and supporting brackets. Accurate cutoff directs the light only on the side walkways and roof of the tank and not on the water where it might interfere with measurements.

Each line of tubing is supplied with power through a 20-kva transformer. Three-phase conductors operating at 5 kv run the full length of each line of trunking. Tubes are connected four in series to the high-voltage lines through chokes mounted at intervals directly under the trunking, with their terminals located inside the trunking. Thus, all high tension connections, including those to the turned-back tube electrodes are completely enclosed.

Installation was developed by the General Electric Co., Ltd., of England to the basic design of the British Ministry of Works. Photo and data courtesy of Leo Walter, Consulting Engineer, Painswick, England.

ABOUT PEOPLE

Parenthetical designations denote membership grade in the Society.

The election of **Henry F. Callahan** as a senior vice-president of Sylvania Electric Products Inc. has been announced by Robert E. Lewis, president of the company. In his new position, Mr. Callahan will assume full responsibility for the operations of the Lighting Products Division, Salem, Mass. He succeeds **Frank J. Healy,** a director and senior vice-president of the company, who will continue to have responsibility for the operations of the Semiconductor Division. Also announced by Sylvania was the appointment of **Max E. Doney** (A) as district sales manager for the new Cincinnati district of the Lighting Products Division. The district will consist of trading areas formerly included under the Chicago, St. Louis and Cleveland districts. Mr. Doney will be located in Cincinnati.

The appointment of **Ernest H. Salter** (F) as chief engineer of Electrical Testing Laboratories, Inc., New York City, has been announced by H. S. Beagle (M), president of ETL. Mr. Salter succeeds **Gordon Thompson,** who has been named vice-president and technical director. **A. R. Chick** (M) will replace Mr. Salter as manager of the Photometric Laboratory and **Roger J. Amorosi** has been appointed assistant to the chief engineer.

Raymond J. Palmer (M) retired from The Detroit Edison Co., Detroit, Mich., on February 1. Mr. Palmer had been associated with the company for nearly 39 years, serving as municipal lighting engineering coordinator since 1954. As a lighting engineer, he was responsible for the design of street lighting systms for several Michigan communities, including Grosse Pointe, Dearborn, River Rouge and Ferndale.

Dr. Bristow Guy Ballard, vice-president (scientific) of the National Research Institute of Canada, has been elected 1961-1962 president of the Engineering Institute of Canada. He will take office during the 75th annual meeting of the Institute in Vancouver, May 31 to June 2. Dr. Ballard will succeed **Dr. George McK. Dick** of Sherbrooke, Que.

The Litecontrol Corp., Watertown, Mass., has announced the appointment of **Andrew J. Moran** as vice-president in charge of research and development of the new Electric Heating Division, effective February 1. **Robert W. Danforth** (A) will succeed Mr. Moran as sales manager of the firm's Lighting Division.

The Ward Leonard Electric Co., Mount Vernon, N. Y., has announced the appointment of **George M. Stapleton** as general manager. Mr. Stapleton, a vice-president of the company since 1956, will also continue to serve as manager of dimmer sales.

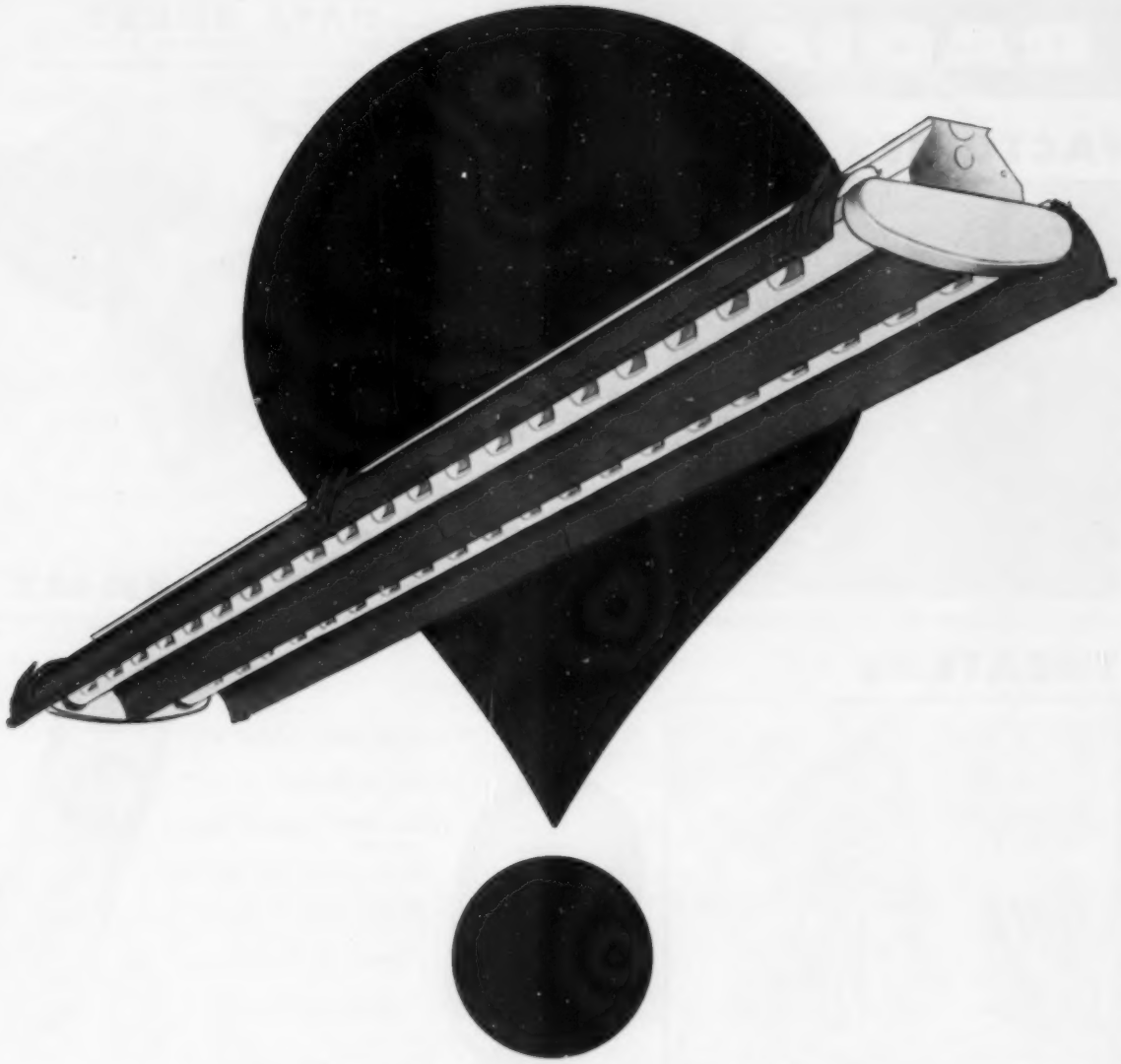
Leo Dolkart (ME), IES charter member, has been elected to a three-year term on the Advisory Council of the Society for the History of Technology. Council members are chosen on the basis of distinguished scholarship or eminent service to technological studies. Mr. Dolkart is a consulting electrical engineer in Chicago, Ill.

Roy A. Palmer (F), illuminating engineer, Duke Power Co., Charlotte, N. C., has received the Distinguished Service Award of the Charlotte Engineers Club. The award was presented at the club's annual banquet, at which **Edwin Vennard,** managing director of EEI, was the principal speaker.

The promotion of **John William Hammond** from industrial promotions to regional manager of the northwest region has been announced by the Appleton Electric Co., Chicago, Ill. Mr. Hammond will succeed **Eric A. Hakanson,** who will retire after 32 years with the company.

Charles J. Stuart has been named manager of the Fort Atkinson, Wis., plant of Thomas Industries Inc., Louis-

(Continued on page 29A)



A statement of fact from ***CURTIS-ALLBRITE:***

"Our CA88 Alzak luminaire delivers more glare-free light than any other industrial fixture."

Good lighting is recognized as an important production tool and a real industrial cost saver. Survey after survey has shown that proper lighting can improve production quality, create safer working conditions and improve employee relations. Maximum efficiency in industrial lighting is provided by the Curtis-AllBrite CA88 luminaire with Alzak aluminum reflectors, because it assures more glare-free light than any other industrial fixture. The Alzak finishing process puts a hard, durable, colorless coating on aluminum reflectors. This life-time finish is non-tarnishing, stainless, easy to clean and maintain. The CA88 luminaire is designed for Power-Groove lamps but can also be used with other high out-put lamps. Write for complete information today. Curtis-AllBrite Lighting, Inc., 6135 W. 65th Street, Chicago 38, Illinois—352 Shaw Road, South San Francisco, Calif.—Toronto, Canada—Vancouver, B. C., Canada.

CURTIS-ALLBRITE
LIGHTING, INC.
Visioneers in Planned Lighting

RADIANT

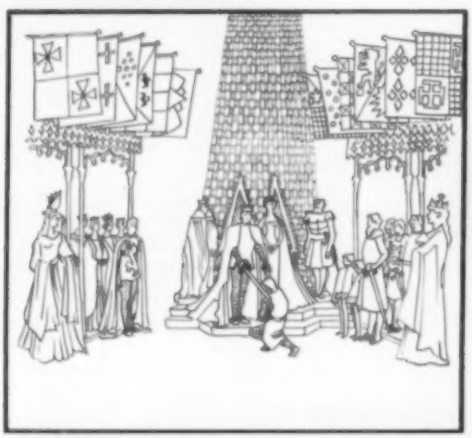
DATA SHEET
Hard Glass Industrial Incandescent & Mercury Reflector Lamps • On Approved Government Contract Lists • **NATIONAL DISTRIBUTION**

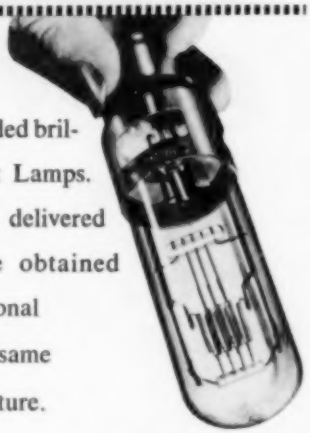
FACTORIES

Increase "job-light" at the working level with Radiant Lamps. Their shock and vibration resistant construction assures continuous light under most adverse conditions.

RADIANT

THEATERS





"Camelot" given added brilliance by Radiant Lamps. 20% more light delivered than could be obtained from conventional lamps in the same spotlight fixture.

RADIANT

AIRPORTS

Brilliantly lighted by Radiant Lamps that resist temperature and humidity changes. These weather-proof lamps at Idlewild Airport have withstood New York City's worst winter in 80 years.

For detailed information about Radiant Lamps and their varied uses write, or call Les Deutsch at Bigelow 3-6850.

RADIANT LAMP CORPORATION
300 Jelliff Avenue • Newark 8, New Jersey

RADIANT

AD NO. 61-17

(*Continued from page 26A*)

ville, Ky., according to an announcement by Howard C. Prange, vice-president in charge of manufacturing. Prior to his new appointment, Mr. Stuart served as chief engineer and manager of engineering at Fort Atkinson.

L. M. Endres (A) retired on January 31 as assistant project coordinator (research), Office of Design and Construction, Public Buildings Service, General Services Administration, Washington, D. C. After 30 years of government service, Mr. Endres' retirement plans include a move to Corpus Christi, Texas, where he intends to continue his IES activities.

John F. Culp, former assistant to the president of Corning Glass Works, Corning, N. Y., has been named general manager of the Sola Electric Co., Elk Grove, Ill., a division of Basic Products Corp., Milwaukee, Wis. Other new appointments announced by Sola include **H. H. Velten** as vice-president of manufacturing, **D. C. McDonald** as director of engineering, **V. C. Thomas** as personnel manager and **E. E. Bolt** as superintendent of the recently established Power Supply Assembly Department.

Carl O. Young has been appointed manager of the Lamp Parts Department, Westinghouse Lamp Division, Bloomfield, N. J. In his new position, Mr. Young will direct the various activities of the department, including marketing, manufacturing and engineering.

Bellman, Gillett & Richards has named **Robert W. McMahon** (A) to be in charge of electrical engineering. Mr. McMahon succeeds **Fred J. Speirs,** who retired on January 1 after 37 years with the firm.

Harry C. Johnson has been named staff representative for the electrical equipment section of the National Safety Council, according to an announcement by Roy G. Benson, director of industrial safety. Prior to joining the Council in 1956, Mr. Johnson was safety engineer for the J. I. Case Tractor Works, Racine, Wis.

John Kinnaird (A), former sales manager of the Lighting Division of the National Electric Supply Co., has joined M. J. Hooey and Associates, Palo Alto, Calif.

Goren-Newman, Inc., has been named to represent the Smitheraft Corp., Chelsea, Mass., in the metropolitan New York area. **Lou Goren** (M) has been manager of commercial lighting for the Globe Lighting Products Co., Inc., Brooklyn, N. Y. **Ira Newman** (M) has represented the Swivelier Co., Inc., Nanuet, N. Y., in New York City.

The appointment of **Howard L. Burpo, Jr.** as regional manager in the mid-western sales region of the Union Carbide Plastics Co., a division of the Union Carbide Corp., has been announced by J. B. Knowles, manager of sales for the company. Mr. Burpo will be headquartered in Chicago, Ill. **P. W. Wood,** midwestern regional manager since November, 1958, will serve as product manager —polyethylene. He will be located in New York City.

Tal Person has been appointed district sales representative in northern Texas for Halo Lighting Products, Inc., Chicago, Ill.

Herbert Wile, Jr., has joined the Keystone Electric Manufacturing Co., Philadelphia, Pa., as national advertising and sales promotion manager, according to an announcement by Leonard Siegel, president of the firm. Formerly associated with Metalcraft Products Co., Inc., Philadelphia, Mr. Wile's new duties also include the post of regional sales manager.

Kenneth C. Dorland (A) has been named to the post of general sales manager for the Union Metal Manufacturing Co., Canton, Ohio. He succeeds the late **Louis F. Heckmann** (M), vice-president in charge of sales, who died on January 14. Mr. Dorland is a member of the National Electrical Manufacturers' Association and a director of its Lighting Division. He is also a member of the Municipal Sign Association and his company's representative to the Institute of Traffic Engineers.

George S. Watts (M) vice-president of the Edwin F. Guth Co., St. Louis, Mo., retired on March 1. He joined Guth in 1910 as a bookkeeper, later became purchasing agent and has been vice-president since 1916.

The appointment of **Richard L. Jones** (A) as a representative in the Houston, Texas, area has been announced by Virden Lighting, a division of John C. Virden Co., Cleveland, Ohio.

Garcy Lighting, Chicago, Ill., has announced the appointment of **Charles T. Wallace** (A) as regional sales manager. Mr. Wallace, with headquarters in Chicago, will cover the midwestern states.

The Randolph Engineering Corp., El Monte, Calif., has been appointed sales representative in the northern California and northern Nevada areas for the Lamplighter series photoelectric lighting control of The Acme Wire Co., New Haven, Conn. **H. R. McClain** has been named manager of Randolph's branch office in Menlo Park, Calif., recently established for the supervision of the firm's newly extended sales area.

According to an announcement by A. F. Uhrlandt, director of field sales for the Crouse-Hinds Co., Syracuse, N. Y., **John M. Adams** (A) has been named Los Angeles regional manager.

The formation of the J. H. Spaulding Co., a division of the Whiteway Manufacturing Co., Cincinnati, Ohio, has been announced by **Joseph H. Spaulding,** president of Whiteway. The new division will market some of the lighting

(*Continued on page 30A*)

IES National Technical Conferences

1961—September 24-29—Chase Park Plaza Hotel, St. Louis, Missouri

1962—September 9-14—Statler-Hilton Hotel, Dallas, Texas

1963—September 8-13—Sheraton-Cadillac Hotel, Detroit, Michigan

1964—August 30-September 3—Fontainebleau Hotel, Miami Beach, Florida

1965— Americana Hotel, New York, N. Y.

(Continued from page 29A)

equipment manufactured by Whiteway for the petroleum marketing industry, in addition to outdoor lighting equipment, concentrating especially on shopping centers, athletic fields and other large projects. **Robert J. Besal,** formerly sales manager of the Steber Manufacturing Co., Broadview, Ill., has been appointed general sales manager for the Spaulding Division.

The appointments of the following sales representatives have been announced by the N L Corp., Cleveland, Ohio: **Jay Johnston,** Kansas City, Mo.; **R. Bruce Thompson** (M), Rochester, N. Y.; **Perkins Brothers Sales Co.,** Oklahoma City, Okla.; **Factory Sales Agency,** Nashville, Tenn.

The Universal Manufacturing Corp., Paterson, N. J., has announced a realignment of its national sales organization. **Milton Nathanson** has been named to the newly created position of director of public relations. **Leo Kanter** will be in charge of sales to original equipment manufacturers, the post held by Mr. Nathanson prior to his new appointment. Mr. Kanter's former territory will be apportioned between **Edward Brill,** who will add Canada to his eastern area, and **Bernard Lieberman,** who has been assigned to the central and southern regions. **Howard Hennessy** will represent the Distributor Division in eastern Pennsylvania, southern New Jersey and Delaware. From headquarters in Los Angeles, **Harry Sunshine** will cover northern California, Oregon and Washington and **Al Cohen** will handle southern California. Universal also announced the appointments of the following manufacturer's representatives: **Abbott Sales Co.,** Phoenix, Ariz.; **Ajax Electrical Sales Co.,** St. Louis, Mo.; **Burrus and Matthews,** Dallas and Houston, Texas; **Electrical Products Co.,** Omaha, Neb.; **Larry Girard Co.,** Tucson, Ariz.

Jack Ballard has joined the sales department of the Lancaster Glass Corp., Lancaster, Ohio. Mr. Ballard was formerly associated with Philip Carey Corp., Detroit, Mich.

Deaths

L. H. Benson, Rochester Section
C. O. Carpenter, Jr., Tennessee Valley Section
C. C. Keene, Southeast Florida Section
C. E. King, Tar Heel Section
W. H. Rorabaugh, North Texas Section
J. B. Wolk, Winnipeg Chapter

HELPFUL LITERATURE

The Light Side of Decorating, available from Superior Electric Co., Bristol, Conn., 36 pp., 25 cents.

Four basic types of lighting — area, task, perimeter and accent—are used in various combinations in 40 interiors to demonstrate the use of lighting as an aid to decoration. The interiors, designed by former American Institute of Decorators President, C. Eugene Stephenson, cover every room in the home and a variety of decorating styles. Construction details of the lighting techniques employed are keyed to each illustration.

Ideas for dimming to vary room atmosphere at minimum cost are supplemented by a section on how to choose proper dimming equipment.

Easy Lighting Layout Sheets, OLP-1000 series, available from General Electric Co., 1 River Road, Schenectady 5, N. Y., no charge.

Made available by the General Electric Outdoor Lighting Department, each number in this series of layout sheets for outdoor lighting problems contains general rules, a sample problem, step-by-step calculations of the solution and a construction drawing. Among the sheets published thus far are installations for highway signs, building facades, loading docks, football fields, baseball parks, miniature golf courses and storage and materials handling areas.

Lighting Lease Plan, Booklet SA-8865, available from Westinghouse Lighting Division, Edgewater Park, Cleveland, Ohio, 4 pp., no charge.

This publication describes the operation of the company's lighting lease plan including installation costs, purchase option and renewal features. As aid to determining the usefulness of the plan for a particular user, there is a chart for calculation of monthly rental charges.

Lighting for Industry, Booklet B-570, available from Better Light Better Sight Bureau, 750 Third Ave., New York 17, N. Y., 16 pp. 25 cents each in quantities under 100; $20 per hundred in quantities up to 1000; $180 per thousand in quantities of 1000 or more, FOB, New York, N. Y.

Designed to inform plant executives of the need for the higher lighting levels recommended for industrial areas, this booklet describes the Blackwell research which formed the basis for the IES recommendations, discusses the quality factors in industrial lighting and explains the specific benefits, in terms of increased production and fewer rejects, which can result from properly lighted plants.

The list of current recommended industrial lighting levels is supplemented by ten illustrated case histories which demonstrate how good lighting paid off for users.

Sportslighting — Nighttime Is Playtime, Bulletin 2721, AIA File No. 31F-30, available from Crouse-Hinds Co., Syracuse 1, N. Y., 68 pp., no charge.

The July, 1960, revised edition of this booklet which features approximately 100 suggested lighting layouts for both indoor and outdoor sports, also includes a section on IES and NEMA floodlight classifications and a guide to the measurement of illumination levels in floodlighting installations. A handy summary table lists number and types of floodlights, number and height of poles, recommended footcandle levels and kilowatt load for each of the sports areas covered.

Lighting Design Booklet, VE-900, available from Sylvania Lighting Fixtures, One 48th St., Wheeling, W. Va., 12 pp., no charge.

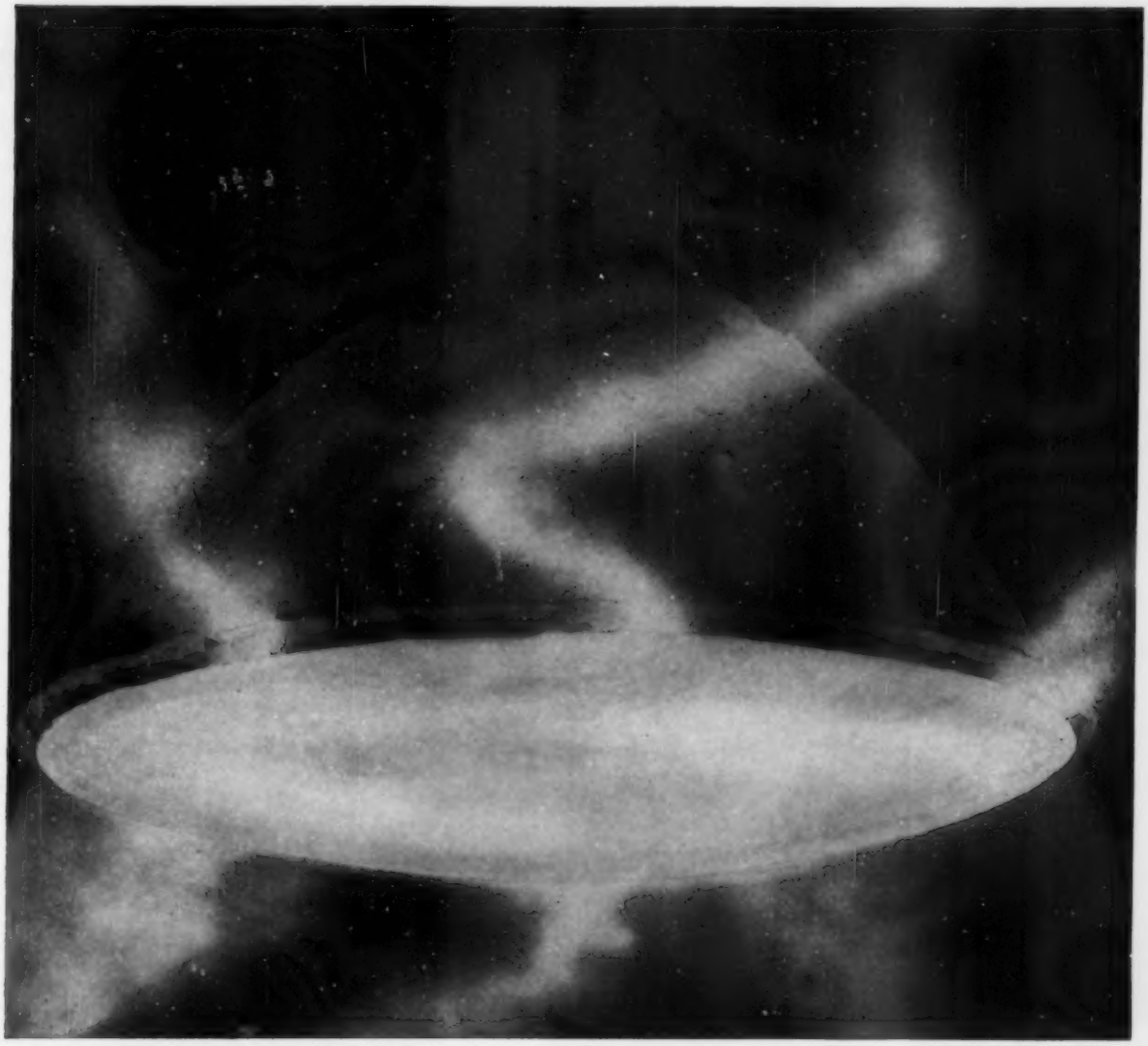
A concise coverage of lighting terms, formulas and important design factors, this booklet also includes photometric CU tables for pendant- and surface-mounted fixtures plus 10 per cent and 30 per cent floor reflectances. Area lighting systems are covered by formulas and CU tables for both panel and louver-type ceilings.

A chart of current recommended illumination levels for some major application areas is conveniently located on the back page.

Guide to Incandescent and Fluorescent Lamps for Commercial Applications, Pamphlet A-6976, available from Westinghouse Lamp Division, Bloomfield, N. J., no charge.

A handy reference guide to the color characteristics of fluorescent lamps, this pamphlet describes seven fluorescent "whites" and lists suggested applications for each. A chart of 11 popular paint colors, their approximate reflec-

(Continued on page 32A)



CROUSE/HINDS Dust-Tight* Lighting IN ACTION!

Caked and blanketed with layer on layer of dust, the DLA Dust-Ignition-Proof Lighting Fixture in our picture continues to function perfectly . . . at safe operating temperature . . . month in, month out. That's because it's sealed tight and stays cool. Dust can't get in and won't catch fire . . . no matter how thick you pile it!

You can get Crouse-Hinds dust-ignition-protection for any type of lighting . . . incandescent, fluorescent or mercury vapor . . . bench, area or flood . . . stationary or portable! But that only skims the surface of your dust-danger problems.

How about circuit-breaking plugs and receptacles interlocked with switches? Or push-button stations with tumbler or mercury switches? . . . control stations, pilot lights and panel boards? . . . motor starters, circuit breakers and combinations? Even telephones, instruments and signals? Crouse-Hinds has dust-ignition-proof protection for them all. For hundreds of others, too

Get whatever you need from a single source. Just ask your Crouse-Hinds Distributor.

*Dust-Ignition-Proof

CROUSE/HINDS
SYRACUSE / NEW YORK

OFFICES: Atlanta Baton Rouge Birmingham Boston Buffalo Charlotte Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Omaha Philadelphia Pittsburgh Portland, Ore. St. Louis St. Paul Salt Lake City San Francisco Seattle Tulsa Washington
RESIDENT REPRESENTATIVES: Albany Baltimore Reading, Pa. Richmond, Va.
Crouse-Hinds of Canada, Ltd., Toronto, Ont. Crouse-Hinds-Domex, S. A. de C. V. Mexico City, D. F. Peterco, Sao Paulo, Brazil

Installations in the News...

Bright Lights for Stars on Hollywood's "Walk of Fame"

Long famous for superlatives, Hollywood has added another—one of the most brightly lighted streets in the world. A lighting level of over 10 footcandles illuminates the "Walk of Fame," on Hollywood Boulevard and Vine Street, 15,000 lineal feet of terrazo sidewalk containing the names and symbols of over 1200 stars of radio, television, records and motion pictures.

The lighting is from over 150 specially designed star-studded fixtures (see close-up at right) each equipped with three 700-watt deluxe white mercury lamps. To insure good color rendition, the lamps, specially developed for the installation, have a phosphor coating on the bulb and are used with a special filter glass. Standards are equipped with outlets to provide plug-ins for seasonal decorative lighting displays without the need for wires strung between light poles.

Lighting was installed under the direction of O. W. Meissner, director of the Los Angeles Bureau of Street Lighting. Photos and data courtesy Westinghouse Electric Corp., Pittsburgh, Pa.

(*Continued from page* 30A)

tion factors and the effects of the seven fluorescent colors and incandescent filament colors upon each is also included.

The pamphlet is punched for insertion in a three-hole binder.

Comfort Conditioning with Light and Air, AIA File No. 31F-2/30E, available from Day-Brite Lighting, Inc., 6260 N. Broadway, St. Louis, Mo. or Barber-Colman Co., Rockford, Ill., 24 pp., no charge.

In line with the present trend toward the integration of lighting and air conditioning, this booklet was designed to familiarize the lighting engineer with the fundamental principles of air conditioning, the air conditioning engineer with basic lighting principles and the layman with the workings of both.

The lighting section includes recommended levels of illumination for various commerical and industrial areas, an outline of the steps in planning a lighting design (including basic formula for computing the number of fixtures needed) and a glare factor chart. The air conditioning section presents an air distribution comfort chart (a family of curves defining maximum permissible differences in room temperatures for various air velocities), a chart of recommended sound levels for industrial and commercial locations and criteria for the selection of air conditioning units.

Fabrication Data on Extruded Acrylic Sheets, Bulletin EX-101, available from Cadillac Plastic & Chemical Co., 15111 Second Ave., Detroit 3, Mich., 12 pp., no charge.

Information on handling, machining, forming, cementing and annealing of extruded acrylic sheets is supplemented by a table of properties and four pages of light transmittance charts, including comparison with cast sheet.

NEW MEMBERS

At the meeting of the IES Council in New York City on February 9, 1961, the following were elected to membership. Names marked * are transfers from Associate Member Grade.

CANADIAN REGION

BLUENOSE CHAPTER

No Elections

FOREST CITY (LONDON) CHAPTER

No Elections

GOLDEN WEST CHAPTER

No Elections

HAMILTON, ONTARIO CHAPTER

No Elections

MARITIME CHAPTER

No Elections

(*Continued on page* 54A)

ABOVE ALL:

Styrene lighting louvers molded of
LUSTREX® PERMA TONE

Lighting installation in Heartland office building of the National Commercial Bank and Trust Company of Albany (N.Y.). Louvers of Lustrex perma tone made by Sinko Mfg. and Tool Company, Chicago.

Here's why Lustrex perma tone is the most popular ultraviolet light-stabilized styrene today.

You can create large areas of illumination with uniform light distribution, and good diffusion, that are strikingly handsome yet low in cost. Lustrex perma tone—exceeding IES-NEMA-SPI joint specifications for ultraviolet light-stabilized styrene—assures truly translucent whites, and a complete range of colors. It is light in weight for easy handling, installation and maintenance—and it is dimensionally stable.

New Impact Lustrex perma tone provides extra toughness and flexibility for snap-fitting to metal parts, high resistance to abnormal abuse, and lighter weight through thinner walls. Write for comprehensive technical report on both types of perma tone, including accelerated aging test results and other valuable data on styrene in lighting, to Monsanto Chemical Company, Plastics Division, Room 801, Springfield 2, Mass.

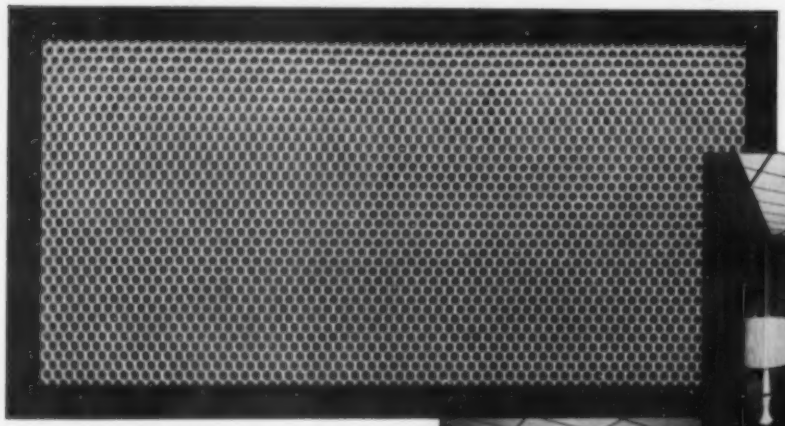
LUSTREX: Reg. U. S. Pat. Off.

Monsanto

MONSANTO INNOVATOR IN **PLASTICS**

introducing "METALCEL"

... the all-new Steel Luminous Ceiling Panel ...



Fannon Products Division of Hupp Corporation, in conjunction with McCord Corporation have introduced this new product long in demand . . . a highly refined and practical STEEL panel — hexagonal in design offering great strength.

Typical installation showing how beautiful METALCEL coincides to decor — design and functional service

specifications:

Metal Thickness:
.0083 tin mill black plate steel

Construction:
Panel is made of one continuous piece of steel and is copper brazed in a reducing atmosphere at 2050°F.

Crushing Load:
1,450 lbs. per sq. inch

Pre-Paint Treatment:
zinc phosphate

Paint Specifications:
two coats of baked white enamel

Humidity Resistance:
100% RH @ 100°F — 500 hours min.

Water Soak Resistance:
90°F aerated — 2000 hours min.

5% Salt Spray Resistance:
250 hours min.

Weight per square foot:
painted 0.98 lbs. per sq. ft.
unpainted 0.94 lbs. per sq. ft.

METALCEL IS AVAILABLE FROM ANY OF THE FOLLOWING FIRMS:

The Wakefield Company • Newman-Schranz Lighting Company • Pittsburgh Reflector Company
Electro Lighting Corporation • Thermotank Incorporated • Litecraft Manufacturing Corporation
Gruber Lighting • Smoot-Holman Company • Supreme Lighting Company
Smithcraft Corporation • Lighting Products, Inc.
The Albert Sechrist Manufacturing Company • Spectralite Ltd. — Canada
Integrated Lighting Ltd.—Canada • Wakefield Lighting Ltd.—Canada

for catalog: **FANNON PRODUCTS Division of Hupp Corporation**
3000 East Woodbridge • Detroit 7, Michigan

SUSTAINING MEMBERS

A

Abbey Electric Co.
15 E. 69th St.
Chicago 37, Ill. *Ted Cohan*

Abolite Lighting Division
Jones Metal Products Co.
West Lafayette, Ohio *E. F. Mulligan*

Acme Lighting & Mfg. Co.
949-65 E. 51st St.
Los Angeles 11, Calif. *Albert Sultan*

Active Electric Co.
5450 W. Fullerton Ave
Chicago 39, Ill. *Robert W. Winne*

Advance Lighting Ltd.
106 Midland St.
Winnipeg, Man. *J. M. Kerluke*

Advance Transformer Co.
2950 N. Western Ave.
Chicago 18, Ill. *A. E. Feinberg*

Ainsworth Electric Co. Ltd.
131 Bermondsey Road
Toronto 16, Ont. *K. D. Ainsworth*

Alabama Power Co.
600 N. 18 St.
Birmingham 2, Ala. *G. L. Morris*

Alkco Manufacturing Co.
4224 N. Lincoln Ave.
Chicago 18, Ill. *A. J. Kurtzon*

Allan Electric Co.
42 Park Ave.
Paterson, N. J. *L. R. Shapiro*

Allied Chemical Corp.
Plastics and Coal Chemical Division
40 Rector St.
New York 6, N. Y. *Dr. M. H. Bigelow*

Edward P. Allison Co., Inc.
300 W. Washington St.
Chicago 6, Ill. *C. W. Abrell*

Aluminum Co. of America
Alcoa Process Development Laboratories
P. O. Box 1012
New Kensington, Pa. *R. H. Vandenberg*

Amalgamated Electric Corp. Ltd.
384 Pape Ave., Toronto, Ont. *George T. Watson*

American Concrete Corp.
5092 N. Kimberly Ave.
Chicago 30, Ill. *J. W. Lewis*

American Electric Construction Co., Inc.
4453 N. Central Ave.
Chicago 30, Ill. *Clyde W. Grove*

American Louver Co.
5308 N. Elston Ave.
Chicago 30, Ill. *Walter Glass*

American-Saint Gobain Corp.
4375 Old Wm. Penn Highway
Turtle Creek, Pa. *F. W. Mowrey*

American Sterilizer Co.
2426 W. 23rd St., Erie, Pa. *Howard Haynes*

Charles A. Anderson & Co.
1214 Nicollet Ave.
Minneapolis 4, Minn. *George R. Anderson*

Warren D. Anderson Sales Co.
P.O. Box 8023, Miracle Mile Branch
Minneapolis 16, Minn. *W. D. Anderson*

Appalachian Electric Power Co.
40 Franklin Rd., S. W., P. O. Box 2091
Roanoke, Va. *G. J. Furr*

Appleton Electric Co.
1701-1759 Wellington Ave.
Chicago 13, Ill. *Norton Appleton*

Arco Electric Supply Co., Inc.
201 E. 42nd St.
New York 17, N. Y. *P. D. Samberg*

Arizona Public Service Co.
501 S. Third Ave.
Phoenix, Ariz. *Don Willis*

Arkansas Power & Light Co.
Little Rock, Ark. *E. G. Barry*

The Art Metal Co.
1814 E. 40th St.
Cleveland 3, Ohio *G. E. Glatthar*

Atlantic City Electric Co.
1600 Pacific Ave.
Atlantic City, N. J. *I. C. Dixon*

B

Baltimore Gas & Electric Co.
1212 Lexington Bldg.
Baltimore 1, Md. *M. C. Albrittain*

Beaux Arts Lighting Co. Inc.
111 E. 12th St., New York, N. Y. *Irwin Kamin*

Benjamin Division
Thomas Industries Inc.
Des Plaines, Ill. *B. S. Benson, Jr.*

Black & McDonald Ltd.
101 Parliament St.
Toronto, Ont. *W. J. McDonald*

The Blommel Sign Co.
735 Wayne Ave.
Dayton 10, Ohio *W. E. Blommel*

BMD and R, Inc.
7020 Walker St., St. Louis Park
Minneapolis, Minn. *Cecil H. Branham*

Board of Water and Light
116 W. Ottawa St., P. O. Box 570
Lansing 3, Mich. *Roy Culham*

Boston Edison Co.
39 Boylston St.
Boston 12, Mass. *R. B. Brown, Jr.*

British Columbia Electric Co. Ltd.
970 Burrard St.
Vancouver 1, B. C. *R. G. Scott*

British Columbia Electric Co. Ltd.
820 Pandora Ave.
Victoria, B. C. *W. C. Mearns*

Broadway Maintenance Corp.
1271 McCarter Highway
Newark 4, N. J. *Charles Fogarty*

Brockton Edison Co.
36 Main St.
Brockton 67, Mass. *C. F. Werner*

Buck Electrical Contractors Inc.
5246 W. Fullerton Ave.
Chicago 39, Ill. *Anton J. Mayer*

Buffalo Electric Co., Inc.
75 W. Mohawk St.
Buffalo 2, N. Y. *Clair O. Dean*

Butler Electric Co. Inc.
2832 Washington Ave.
St. Louis, Mo. *Henry Arendes*

C

C. & M. Products Ltd.
124 Crockford Blvd.
Scarboro, Ont. *J. J. Caragata*

Cadillac Electric Supply Co.
431 E. Larned St.
Detroit 26, Mich. *H. C. Simonton*

California Electric Power Co.
P.O. Box 1029
San Bernardino, Calif. *W. F. Lambirth*

Camber Lighting Inc.
37 Montgomery St.
Jersey City, N. J. *Leonard Borko*

Cambridge Electric Light Co.
46 Blackstone St.
Cambridge 39, Mass. *James L. Corrigan*

Canadian General Electric Co. Ltd.
Industrial Products Division
224 Wallace Ave., Toronto, Ont. *A. C. Calderone*

Canadian General Electric Co. Ltd.
Lamp Division
165 Dufferin St., Toronto, Ont. *E. H. Lindsay*

Canadian National Exhibition Association
Exhibition Park
Toronto, Ont. *H. E. McCallum*

Canadian Utilities, Ltd.
10040 - 104th St.
Edmonton, Alta. *J. E. Bagshaw*

Canadian Westinghouse Co. Ltd.
Lighting Division
Granby, Quebec *M. J. McAuliffe*

Canning, Pekara Inc.
2144 N. Wood St.
Chicago 14, Ill. *Claude E. Canning*

Central Electric Supply Co.
P. O. Box 267
Denver, Colo. *Edward S. Goldman*

Central Hudson Gas & Electric Corp.
50 Market St.
Poughkeepsie, N. Y. *J. E. Doolittle*

Central Illinois Light Co.
300 Liberty St.
Peoria 2, Ill. *J. W. Brown*

Central Illinois Public Service Co.
607 E. Adams St.
Springfield, Ill. *B. L. Palm*

Central Louisiana Electric Co. Inc.
715 Main St.
Pineville, La. *P. R. Taylor*

Central Maine Power Co.
9 Green St.
Augusta, Me. *Roland W. Hess*

(Continued on page 36A)

(Continued from page 35A)

Central Power & Light Co.
P. O. Box 2121
Corpus Christi, Texas — *James M. Williams*

Central Queens Electric Supply Corp.
92-35 166th St.
Jamaica, N. Y. — *Lawrence Lieberman*

Century Lighting, Inc.
521 West 43rd St.
New York 36, N. Y. — *Edward F. Kook*

Champion Lamp Works
Division of Consolidated Electric Lamp Co.
330 Lynnway
Lynn, Mass. — *F. F. Burchsted*

Chicago Electrical Supply Co.
420 N. Ashland Ave.
Chicago 22, Ill. — *Charles Lechner*

Chicago Miniature Lamp Works, Inc.
1500 N. Ogden
Chicago, Ill. — *E. E. Erickson*

Cincinnati Gas & Electric Co.
4th & Main Sts.
Cincinnati 1, Ohio — *J. R. Hartman*

City of Burbank — Public Service Dept.
P. O. Box 631
Burbank, Calif. — *Ralph Foy*

City of Glendale — Public Service Dept.
119 N. Glendale Ave.
Glendale 6, Calif. — *L. W. Grayson*

City of Los Angeles, Dept. of Water & Power
207 So. Broadway
Los Angeles 54, Calif. — *Ivan L. Bateman*

City of Pasadena
Municipal Light & Power Dept.
302 City Hall, Pasadena 1, Calif. — *T. M. Goodrich*

City of Riverside — Electric Light Dept.
P. O. Box 826
Riverside, Calif. — *Everett C. Ross*

City of Seattle — Dept. of Lighting
1015 Third Ave.
Seattle 4, Wash. — *A. C. Tyler*

City of Tacoma
Dept. of Public Utilities, Light Div.
P. O. Box 1639
Tacoma 1, Wash. — *Roy H. Weston*

The Cleveland Electric Illuminating Co.
P.O. Box 5000
Cleveland 1, Ohio — *R. C. Hienton*

CLM Industries, Division of
McGraw-Edison (Canada) Ltd.
Postal Station H
Toronto 13, Ont. — *T. G. Quance*

Columbia Lighting
2310 N. Fancher Way
Spokane, Wash. — *Walter A. Toly*

Columbus & Southern Ohio Electric Co.
215 N. Front St.
Columbus, Ohio — *H. S. Corn*

Commercial Light Co.
215 S. Morgan St.
Chicago. 7, Ill. — *Michael R. Fine*

Commonwealth Edison Co.
72 W. Adams St.
Chicago 90, Ill. — *O. A. Hill, Jr.*

Compco Corp.
1800 North Spaulding Ave.
Chicago 47, Ill. — *S. J. Zagel*

Condi Lite Corp.
889 Broadway
New York 3, N. Y. — *Herbert Hoffman*

The Connecticut Light & Power Co.
P. O. Box 2010
Hartford, Conn. — *A. M. Wade*

Consolidated Edison Co. of N. Y. Inc.
4 Irving Place
New York 3, N. Y. — *G. J. Gillen*

Consumers Power Co.
212 Michigan Ave. W.
Jackson, Mich. — *B. G. Campbell*

Consumers Public Power District
1452 25th Ave.
Columbus, Nebr. — *R. W. Staal*

Continental Electrical Construction Co.
3540 Southport Ave.
Chicago 13, Ill. — *Leo W. Wilz*

Corning Glass Works
Corning, N. Y. — *F. F. Fleischman, Jr.*

Coronet Inc.
80 George St.
Paterson 23, N. J. — *Sam Stein*

Crouse-Hinds Co.
Syracuse, N. Y. — *John S. Haney*

Crouse-Hinds Co. of Canada, Ltd.
1160 Birchmount Rd.
Scarboro, Ont. — *E. Machtinger*

Crownlite Fluorescent Co.
7 Roselle St.
Mineola, N. Y. — *A. L. Siegel*

Curtis-AllBrite Lighting, Inc.
352 Shaw Road
So. San Francisco, Calif. — *R. E. Liepold*

Curtis-AllBrite Lighting, Ltd.
195 Wicksteed Ave.
Leaside, Toronto, Ont. — *H. L. Wright*

Cutler Electrical Products Inc.
5524 Haverford Ave.
Philadelphia 39, Pa. — *David Cutler*

D

Dallas Power & Light Co.
1506 Commerce St.
Dallas 1, Texas — *C. A. Tatum*

A. L. Davis Co., Inc.
44 Duryee St.
Newark, N. J. — *Arthur L. Davis*

Day-Brite Lighting Inc.
5411 Bulwer Ave.
St. Louis 7, Mo. — *C. L. Amick*

The Dayton Power & Light Co.
25 No. Main St.
Dayton 1, Ohio — *H. S. Nonneman*

Dazor Manufacturing Corp.
4483 Duncan Ave.
St. Louis 10, Mo. — *P. L. Read*

Dearborn Glass Co.
6600 S. Harlem Ave.
Bedford Park, Argo P.O., Ill. — *E. J. Porter*

Delaware Power & Light Co.
600 Market St.
Wilmington 99, Del. — *W. A. F. Pyle*

Detroit Edison Co.
2000 Second Ave.
Detroit 26, Mich. — *L. E. Tayler*

The L. C. Doane Co.
10 New City St., Essex, Conn. — *L. C. Doane, Jr.*

Duke Power Co.
P. O. Box 2178
Charlotte, N. C. — *Roy A. Palmer*

E. I. du Pont de Nemours & Co., Inc.
Polychemicals Dept.
Development and Service Section
Wilmington 98, Del. — *D. D. Lee*

Duquesne Light Co.
435 Sixth Ave., Pittsburgh 19, Pa. — *R. W. Heller*

Duro-Test Corp.
2321 Hudson Blvd.
North Bergen, N. J. — *James L. Cox*

E

Eastman Kodak Co.
400 Plymouth Ave. North
Rochester 4, N. Y. — *H. R. Patterson*

Ebasco Services, Inc.
2 Rector St., New York 6, N. Y. — *W. L. Byrne*

William LeRoy Edwards—
Consulting Engineer
165 Alexander St., N.W.
Atlanta, Ga. — *W. L. Edwards*

Efengee Electrical Supply Co.
949 W. Chicago Ave., Chicago 22, Ill. — *Lee Mirus*

Electric Supply Co.
134 Walton St., N.W.
Atlanta, Ga. — *W. W. Crowe*

Electrical Information Publications, Inc.
2132 Fordem Ave.
Madison 1, Wis. — *D. W. Grosshandler*

Electrical Testing Laboratories, Inc.
2 East End Ave.
New York 21, N. Y. — *Hoffman S. Beagle*

Electrical Wholesalers, Inc.
229 Whitehall St. S. W.
Atlanta, Ga. — *F. H. Dendy, Jr.*

Electrolier Mfg. Co. Ltd.
5849 Boyer St.
Montreal, Que. — *Bernard Issenman*

Electro Lighting Corp.
1535 S. Paulina St.
Chicago 8, Ill. — *C. I. Schneider*

Emerson-Pryne Co.
P.O. Box 698
Pomona, Calif. — *Roger W. Holston*

Ender-Monarch Corp.
141 Lanza Ave.
Garfield, N. J. — *Lewis Grenadier*

Englewood Electrical Supply Co.
5801 S. Halsted St.
Chicago, Ill. — *John E. Smith*

F

Fecht Electric, Inc.
5756 N. Western Ave.
Chicago 45, Ill. — *William F. J. Fecht*

Federal Pacific Manufacturing Co.
19 Waterman Ave.
Toronto 16, Ont. — *F. L. Thompson*

Fenestra Inc.
2250 E. Grand Blvd.
Detroit 11, Mich. — *Clyde W. Kelly*

Fischbach, Moore & Morrissey, Inc.
175 West Madison St.
Chicago 2, Ill. — *J. R. Meehan*

Fitchburg Gas & Electric Light Co.
655 Main St., Fitchburg, Mass. — *A. G. Neal*

Flood-Lite Service Inc.
212 Silver Lake Blvd.
Los Angeles 4, Calif. — *B. J. Hartmann*

Florida Power Corp.
101 Fifth St., South
St. Petersburg, Fla. — *W. B. Shenk*

Florida Power & Light Co.
Box 3100, Miami 30, Fla. — *F. E. Autrey*

Fluorescent Equipment & Mfg. Co.
5105 Cowan Ave.
Cleveland 4, Ohio — *Leonard S. Freeman*

Fluores-O-Lite Co.
Evans Terminal, North Broad St.
Hillside, N. J. — *Meyer H. Silverman*

H. A. Framburg & Co.
3320-28 Carroll Ave.
Chicago 24, Ill. — *Stanley A. Framburg*

W. Freeman & Son, Ltd.
275 Woodland Drive
Vancouver, B. C. — *A. Freeman*

The Frink Corp.
211 63rd St.
Brooklyn, N. Y. — *E. W. Lampert*

G

G. & M. Lighting Co.
1821 Chouteau Ave
St. Louis 3, Mo. — *Dan Michelson*

(Continued on page 38A)

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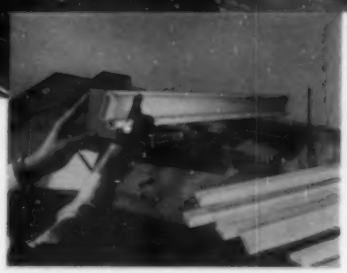
DIE CONSTRUCTION AND PRODUCTION TECHNIQUE ANALYSIS

RAW MATERIAL ANALYSIS



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Successful plastic extrusions for lighting REQUIRE integration of engineering with production techniques. This is an automatic service at K-S-H. In fact, K-S-H has pioneered the way in developing new production techniques and new products through engineering.

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SAN FRANCISCO
EXPORT:
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(Continued from page 36A)

Garden City Plating & Mfg. Co.
1750 N. Ashland Ave.
Chicago 22, Ill. *V. R. Bohlman*

Garfunkel Co.
420-428 Hoboken Ave.
Jersey City, N. J. *Jack D. Saltzman*

General Electric Co.
Accessory Equipment Dept.
1285 Boston Ave., Bldg. 52-EE
Bridgeport 2, Conn. *M. P. Miles*

General Electric Co., Ballast Dept.
1430 E. Fairchild St.
Danville, Ill. *C. G. Grant*

General Electric Co., Lamp Dept.
Nela Park
Cleveland 12, Ohio *A. C. Barr*

General Electric Co.
Outdoor Lighting Dept.
Hendersonville, N. C. *C. J. Meloun*

General Electric Supply Co.
Div. General Electric Co.
1260 Boston Ave.
Bridgeport 9, Conn. *W. W. Booth*

General Fireproofing Co.
Dennick Ave.
Youngstown, Ohio *J. A. Saunders*

General Lighting Products Co.
25 Belgrove Drive
Kearny, N. J. *N. H. Eglowstein*

The Georgia Power Co.
Electric Bldg., Atlanta 1, Ga. *C. M. Wallace, Jr.*

Gibson Manufacturing Co.
1919 Piedmont Circle, N. E.
Atlanta, Ga. *R. R. Gibson*

Gilbert Associates Inc.
525 Lancaster Ave.
Reading, Pa. *Edward M. Davis*

Gilbert-Hodgman, Inc.
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Chicago 20, Ill. *D. W. Hodgman*

Globe Illumination Co.
2121 S. Main St.
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Globe Lighting Products Co. Inc.
1710 Flushing Ave.
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Good Manufacturing Co. Inc.
1015 N. Halsted St.
Chicago 22, Ill. *Louis Mided*

Gotham Lighting Corp.
57-01 31st St.
Long Island City 1, N. Y. *H. M. Gerstel*

Gould Electric Co.
2621 West Belmont Ave.
Chicago 18, Ill. *E. A. Gould, Jr.*

Grand Light & Supply Co.
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New Haven, Conn. *Malcolm Rosen*

Graybar Electric Co. Inc.
420 Lexington Ave.
New York 17, N. Y. *B. F. Benning*

Grimes Manufacturing Co.
515 No. Russell St.
Urbana, Ohio *L. B. Moore*

Guardian Light Co. Inc.
500 North Blvd., Oak Park, Ill. *W. S. Akely*

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P. O. Box 2951
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2615 Washington Ave.
St. Louis 3, Mo. *Fred E. Guth*

H

Hahn Electric Co. Inc.
Manchester & Barrett Station Rd.
P. O. Box 5848, Kirkwood 22, Mo. *R. Hahn, Jr.*

Halo Lighting Products Inc.
4201 W. Grand Ave.
Chicago 51, Ill. *Myron Gerber*

Haluk Lighting & Mfg. Co.
65 Elmira St.
San Francisco, Calif. *William Haluk*

Harjohn Industries
P. O. Box 66, St. Catherines, Ont. *H. D. Hallett*

The Hartford Electric Light Co.
266 Pearl St.
Hartford 3, Conn. *V. J. Ouellette*

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Morton Grove, Ill. *R. R. Hill*

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Berkeley 10, Calif. *D. Paul Daily*

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Holophane Co., Ltd.
418 Kipling Ave. S.
Toronto 14, Ont. *Frank T. Groome*

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Chicago 8, Ill. *Jack R. Stone*

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Chicago 12, Ill. *I. M. Fixman*

Hubbard Aluminum Products Co.
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Pittsburgh 1, Pa. *J. C. Monday*

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Niagara Falls, Ont. *J. A. Williamson*

Hydro-Electric Power Comm. of Ontario
620 University Ave.
Toronto 2, Ont. *J. M. Hambley*

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Chicago, Ill. *Jay Mann*

I

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Decatur 70, Ill. *B. L. Hantle*

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Hazel Park, Mich. *Bert C. Pretzer*

Indiana & Michigan Electric Co.
2101 Spy Run Ave.
Fort Wayne, Ind. *N. W. Stiffler*

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El-Tronics Inc.
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Warren, Pa. *W. H. Houston*

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Iowa-Illinois Gas & Electric Co.
United Light Bldg.
Davenport, Iowa *Gordon Ames*

Iowa Power & Light Co.
312 Sixth Ave.
Des Moines 3, Iowa *A. Paul Thompson*

Iowa Public Service Co., East Division
400 Commercial St.
Waterloo, Iowa *C. R. Wagoner*

Iowa Public Service Co., Sioux City Division
P. O. Box 778
Sioux City, Iowa *C. R. Tracy*

J

Jefferson Electric Co.
Bellwood, Ill. *W. C. Anderson*

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Madison Ave. at Punchbowl Rd.
Morristown, N. J. *R. B. Cole, Jr.*

Joryl Lighting Products, Inc.
42 W. Cermak Rd.
Chicago, Ill. *Chas. Meyerson*

Jewell Electric Products Inc.
17-10 Willow St.
Fair Lawn, N. J. *R. J. Parks*

Joslyn Mfg. & Supply Co.
3700 S. Morgan St.
Chicago 9, Ill. *J. H. Fahey*

K

Kansas City Power & Light Co.
P. O. Box 679
Kansas City 41, Mo. *W. K. Frohock*

Kansas Gas & Electric Co.
P. O. Box 208
Wichita, Kans. *H. W. Hobson*

The Kayline Co.
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Cleveland 14, Ohio *M. A. Eskins*

Kelso-Burnett Electric Co.
223 W. Jackson Blvd.
Chicago 6, Ill. *Sigmund A. Hollinger*

Kemlite Laboratories, Inc.
1819 W. Grand Ave.
Chicago 22, Ill. *James V. Daniels*

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Brooklyn, N. Y. *Eugene A. Stonehill*

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(Subsidiary of Rockwell-Standard Corp.)
1033 Herman St., Nashville, Tenn. *Ted Nemes*

Keystone Electric Manufacturing Co.
2228-36 E. Tioga St.
Philadelphia 34, Pa. *Leonard M. Siegel*

Kil Bar Electric Co.
2261 Clybourn Ave.
Chicago 14, Ill. *H. J. Kilburg, Jr.*

Kingsport Utilities, Inc.
422 Broad St.
Kingsport, Tenn. *J. E. Wright*

Kirby Risk Supply Co., Inc.
302 Ferry St.
Lafayette, Ind. *John C. Dewenter*

Kirchmer Bros. Mfg. Co.
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St. Louis 7, Mo. *A. W. Kirchmer*

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Detroit 7, Mich. *Ivan Kirlin*

Kliegl Bros.
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Knott & Mielly, Inc.
7724 South Racine Ave.
Chicago 20, Ill. *Charles S. Lott*

Kopp Glass, Inc.
Swissvale
Pittsburgh 18, Pa. *C. E. Leberknight*

(Continued on page 40A)

SOLA announces a new 2-lamp ballast

Cool-Core ballast for two 40-watt rapid-start lamps is a new idea from SOLA. It guarantees full-rated light output, using lower-than-ever input: *up to 6 watts less* for the same lumens delivered. Lower wattage additionally means less internal heating, key feature of Cool-Core performance. And SOLA's exclusive "upside-down" insulating principle allows heat to dissipate quickly, along paths that actually utilize the lighting-fixture metal to reduce ballast-case temperature with added efficiency.

The result is extended trouble-free service . . . line-current savings that permit more fixtures per circuit . . . and reduced fixture-operating costs. Yet this improved SOLA Cool-Core ballast *costs no more* than ordinary units! Write today for full facts and prices on the new SOLA Cool-Core, Cat. No. 670-164.

Compare the features . . .

- Provides increased light output, with less power input.
- Allows more fixtures per circuit.
- Improves striking characteristics — Open-circuit RMS voltage is well above minimum requirements. Low-current-crest factor insures long lamp life.
- Cooler in-fixture operation . . . lighter weight.
- UL listed and CBM certified.

SOLA

Division of
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BPC

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Elk Grove Village, Ill.
HEmpstead 9-2800.
IN CANADA, Sola-Basic Products Ltd., 377 Evans Ave., Toronto 18, Ontario

(Continued from page 38A)

K-S-H Plastics, Inc.
Highway 30
High Ridge, Mo. — *R. S. Hawes III*

L

L & P Lighting
Box 157
Olive Branch, Miss. — *Nathan A. Tamm*

Lancaster Glass Corp.
Lancaster, Ohio — *M. R. Hoover*

LaSalle Electric Supply Co.
20216 John R. St.
Detroit 3, Mich. — *A. H. Gatward*

Lax Electric Co., Inc.
512 Sibley St.
St. Paul 1, Minn. — *Charles Leavitt, Jr.*

Legion Lighting Co.
221 Glenmore Ave.
Brooklyn, N. Y. — *Jonas Bellovin*

Louis J. Lerro Co., Inc.
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Philadelphia 32, Pa. — *A. L. Watmough*

Leviton Mfg. Co.
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Brooklyn 22, N. Y. — *Jack Amsterdam*

Lighting Associates Inc.
238 E. 47th St.
New York, N. Y. — *J. S. Raskin*

Lighting Equipment Co.
9 W. Hubbard St.
Chicago 10, Ill. — *Paul G. Tyler*

Lighting Products Inc.
2259 W. Park Ave.
Highland Park, Ill. — *Eric H. Church*

Lighting Services Co.
515 Meriden Rd.
Waterbury, Conn. — *Richard L. Platt*

Lightolier Co.
11 East 36th St.
New York 16, N. Y. — *W. F. Blitzer*

Lightron of Cornwall
195 Hudson St.
Cornwall-on-Hudson, N. Y. — *Eugene Littman*

Line Material Industries
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So. Milwaukee, Wis. — *Stacy Standley*

Litecontrol Corp.
36 Pleasant St.
Watertown 72, Mass. — *Lawrence E. Brown*

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8 East 36th St.
New York 16, N. Y. — *Ben Roisman*

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Conyers, Ga. — *Robert J. Freeman*

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Mineola, N. Y. — *J. F. Dickerhoff*

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142 Delaronde St., Station A
New Orleans, La. — *C. L. Osterberger*

Lowy & Donnath, Inc.
144 East 34th St.
New York, N. Y. — *Anthony J. Scala*

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120 N. Peoria St.
Chicago 80, Ill. — *Albert L. Arenberg*

Luminous Ceilings Inc.
3701 N. Ravenswood Ave.
Chicago 13, Ill. — *Louis Rosenstein*

Luxor Lighting Products Inc.
Empire State Bldg.
New York, N. Y. — *Sergei Markotan*

Lynn Electric Co.
90 Exchange St.
Lynn, Mass. — *J. R. Cornell, Jr.*

M

Macbeth Corp.
P. O. Box 950
Newburgh, N. Y. — *Norman Macbeth*

H. D. MacMackin, Ltd.
179 Prince William St.
St. John, N. B. — *H. D. MacMackin*

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New York 17, N. Y. — *M. R. Minto*

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Winnipeg 10, Man. — *R. R. McNeill*

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Sheboygan, Wis. — *R. A. Manning*

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Detroit 38, Mich. — *William T. McNaughton*

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Chicago 47, Ill. — *George P. Schannon*

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Chicago 44, Ill. — *Henry E. Burkhardt*

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Merrimack-Essex Electric Co.
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C. S. Mersick Electric Supply Corp.
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West Haven, Conn. — *S. R. Shemitz*

Metalcraft Products Co. Inc.
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Metals Manufacturing Co.
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Salt Lake City, Utah — *H. J. Hamilton*

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Reading, Pa. — *T. O. McQuiston*

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Monroe Electric Co.
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Plastics Division
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Minneapolis 2, Minn. — *W. L. Hayes*

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Morlite Equipment Co.
P. O. Box 106
Girard, Pa. — *Finley J. Gordon*

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Chicago, Ill. — *Leo J. McDonald*

Mutual Sunset Lamp Mfg. Co.
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N

The Narragansett Electric Co.
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Providence 1, R. I. — *F. E. Caulfield*

National Electric Wholesalers, Inc.
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Washington, D. C. — *David Leventhal*

Neo Ray Products Inc.
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New York 10, N. Y. — *Leon Conn*

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288 S. 19th St.
Newark 3, N. J. — *J. B. Seidman*

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695 Purchase St.
New Bedford, Mass. — *W. S. Fenstermacher*

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Chicago 39, Ill. — *J. R. Newgard*

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Morristown, N. J. — *E. J. VanDuzen*

New Orleans Public Service Inc.
317 Baronne St.
New Orleans, La. — *E. N. Avegno*

N. Y. State Electric & Gas Corp.
62 Henry St.
Binghamton, N. Y. — *Earle C. Edwards*

Niagara Mohawk Power Corp.
300 Erie Blvd. W.
Syracuse 2, N. Y. — *F. T. McEvoy*

(Continued on page 42A)

Engineer checks temperature rise of experimental floodlight as part of prototype development.

12½-foot-high photometric sphere is one of the useful tools in Revere's research and development laboratory.

What makes Revere the consultant's outdoor lighting choice?

Revere creative engineering makes sure you get all of the light you specify

Consulting electrical engineers know that their clients get all of the light they pay for from Revere equipment. That's because Revere policy is to design up to a performance level, never down to a price level.

From product design right through application engineering, Revere people refuse to compromise with quality in construction and performance. A Revere luminaire not only puts out the total light specified, it puts it out with maximum utilization and efficiency.

The next time you're ready to specify outdoor lighting equipment, be a little skeptical, a little demanding. Ask yourself whether you've really been getting the engineered performance you've specified. Then choose the best way to do your job from the widest line of quality fluorescent, incandescent, and mercury luminaires, poles, fittings and accessories on the market. You'll find that Revere equipment is *design* matched for peak lighting efficiency and *structurally* matched for strength, balance and trouble-free installation.

Write for the comprehensive Revere catalog. Ask any Revere sales engineer to answer your questions about how our complete lighting line can serve your interest. Remember, if you don't see what you need, Revere can design it for you — and get it out to your job on time.

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Long Distance Phone: NIles 7-6060 • Chicago Phone: SPring 4-1200 • Telegrams: WUX Niles
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Research worker selects a calibrated lamp to aid in development of a new outdoor lighting unit.

Revere application engineers fit design-matched equipment to a variety of routine and unusual jobs.

Unique "shower bath" tests weather resistance of newly-designed luminaire under extreme conditions.

(Continued from page 40A)

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27th St. & Virginia Ave.
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North Adams, Mass. — *A. D. Rhodes*

Northern Electric Co. Ltd.
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Montreal, Que. — *A. G. F. Smith*

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Hammond, Ind. — *J. C. Sackman*

Northern Light Co.
1657 N. Water St.
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Minneapolis 2, Minn. — *Carl T. Bremicker*

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Minneapolis 4, Minn. — *N. K. Gullick*

Nova Scotia Power Commission
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Halifax, N. S. — *F. J. Abbass*

NuArt Lighting & Mfg. Co.
2360 West 21st South
Salt Lake City 4, Utah — *H. A. Schoepf*

O

Ohio Edison Co.
Akron 8, Ohio — *Franklyn Dickinson*

Ohio-Midland Light & Power Co.
Canal, Winchester, Ohio — *J. E. Cathers*

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Canton 2, Ohio — *R. W. Osterholm*

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Box 1498, Oklahoma City 1, Okla. — *Earle W. Gray*

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720 Electric Bldg.
Omaha 2, Nebr. — *E. E. Schwalm*

Orange and Rockland Utilities Inc.
Nyack, N. Y. — *D. S. Schaab*

Owens-Corning Fiberglas Corp.
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New York, N. Y. — *R. H. Brautigan*

P

Pacific Associated Lighting & Mfg. Co.
857 Folsom St.
San Francisco, Calif. — *R. K. Meyer*

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Portland 4, Ore. — *F. M. Reis*

Paramount Industries Inc.
G 1080 Ballenger Rd.
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Pedersen & Tilney, Architects
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New York 16, N. Y. — *W. F. Pedersen*

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San Francisco 5, Calif. — *Samuel B. Herst*

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Philadelphia 34, Pa. — *William Ranieri*

Pennsylvania Electric Co.
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Johnstown, Pa. — *R. G. Baker*

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19 E. Washington St.
New Castle, Pa. — *P. G. Dingledy*

Pennsylvania Power & Light Co.
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Allentown, Pa. — *S. F. Diffenderfer*

The Perfeclite Co.
1457 East 40th St.
Cleveland 3, Ohio — *Joseph L. Jaffe*

Pfaff & Kendall
84 Foundry St.
Newark, N. J. — *M. J. Hamilton*

Philadelphia Electrical & Mfg. Co.
1228-36 N. 31st St.
Philadelphia 21, Pa. — *C. W. Huber*

Philadelphia Electric Co.
1000 Chestnut St.
Philadelphia 5, Pa. — *R. G. Rincliffe*

Phoenix Glass Co.
Monaca, Pa. — *D. G. Cameron*

Pierce Electric Co.
367 W. Adams St.
Chicago 6, Ill. — *John H. Pierce*

Pittsburgh Corning Corp.
Port Allegany, Pa. — *William M. Baldwin*

Pittsburgh Plate Glass Co.
1 Gateway Center
Pittsburgh 22, Pa. — *R. G. Whittemore*

Pittsburgh Reflector Co.
P. O. Box 432
Irwin, Pa. — *R. C. Zinsmeister*

Plant Engineering Magazine
308 E. James St., Barrington, Ill. — *Vernon Kempf*

Poindexter Electric Co.
1433 Delaware St.
Denver, Colo. — *Robert J. Walsh*

Portland General Electric Co.
621 S. W. Alder St.
Portland, Ore. — *T. W. Fitch*

The Potomac Edison Co.
55 E. Washington St.
Hagerstown, Md. — *J. P. Coblentz*

Potomac Electric Power Co.
929 E. Street, N. W.
Washington 4, D. C. — *George Bisset*

Powerlite Devices Ltd.
54 Atomic Ave.
Toronto 18, Ont. — *W. L. Hawley*

Precision Light Corp.
P. O. Box 236
Dunellen, N. J. — *W. T. Calcagno*

Prescolite Manufacturing Corp.
2229 Fourth St.
Berkeley 10, Calif. — *W. D. Runswick*

Progress Electric Supply Co.
18225 Schaefer, Detroit 35, Mich. — *Don Kaplan*

Progressive Products Co. Inc.
6615 Milwaukee Ave.
Chicago 31, Ill. — *E. George Goddard*

Public Service Co. of Colorado
900 15th St.
Denver 1, Colo. — *H. T. Rankin*

Public Service Co. of Indiana Inc.
1000 E. Main St.
Plainfield, Ind. — *Robert McMurray*

Public Service Co. of New Mexico
P. O. Box 1560
Albuquerque, N. M. — *O. W. Peddy*

Public Service Co. of Oklahoma
P. O. Box 201
Tulsa, Okla. — *D. J. Frandsen*

Public Service Electric & Gas Co.
80 Park Place, Newark, N. J. — *S. A. Moore*

The Public Utilities Commission
272 Dundas St.
London, Ont. — *V. A. McKillop*

Public Utility District No. 1
Snohomish County, P.O. Box 1007
Everett, Wash. — *K. K. Miller*

Puget Sound Power & Light Co.
1400 Washington Bldg.
Seattle, Wash. — *J. H. Clawson*

Purchase Electric Supply Co.
700 Ottawa, N.W.
Grand Rapids 2, Mich. — *J. W. Gentry*

Pyle National Co.
Steeber Mfg. Co. Division
1334 N. Kostner
Chicago 51, Ill. — *A. G. Foelkner*

Q

Quadrangle Mfg. Co.
32 S. Peoria St.
Chicago 7, Ill. — *D. E. Worrell*

Quebec Hydro-Electric Commission
107 Craig St. W.
Montreal, Que. — *R. E. Gohier*

Quebec Power Co.
P. O. Box 1607
Quebec, Que. — *Jean Saint-Jacques*

Quincy Electric Co.
1 Cliveden St.
Quincy 69, Mass. — *R. L. Noble*

R

Rab Electric Manufacturing Co., Inc.
605 E. 132nd St.
Bronx 54, N. Y. — *R. A. Barna*

Radiant Lamp Corp.
300 Jelliff Ave., Newark 8, N. J. — *Les Deutsch*

G. A. Rafel & Co.
2112 W. Lawrence
Chicago 25, Ill. — *George A. Rafel*

Rambusch Decorating Co.
40 W. 13th St.
New York, N. Y. — *Edward Rambusch*

Raybro Electric Supplies, Inc.
P.O. Box 1351, Tampa 1, Fla. — *Troy A. Brown*

Revere Electric Mfg. Co.
7420 N. Lehigh Ave.
Chicago 48, Ill. — *Murray J. Whitfield*

Revere Electric Supply Co.
2501 W. Washington Blvd.
Chicago 12, Ill. — *Arthur Peterson*

Robert Manufacturing Co. Inc.
99 Dell Glen Ave.
Lodi, N. J. — *Robert Geissenberger*

Rochester Gas & Electric Corp.
89 East Ave.
Rochester 4, N. Y. — *L. C. Twichell*

Rohm & Haas Co.
222 W. Washington Sq.
Philadelphia 5, Pa. — *H. A. Williams*

Rosemount Industries Ltd.
2090 Moreau St.
Montreal, Que. — *Maurice Beaumont*

Ruby Philite Corp.
32-02 Queens Blvd.,
Long Island City 1, N. Y. — *Howard Phillips*

Rumsey Electric Co.
1007 Arch St.
Philadelphia 7, Pa. — *T. W. Lauer*

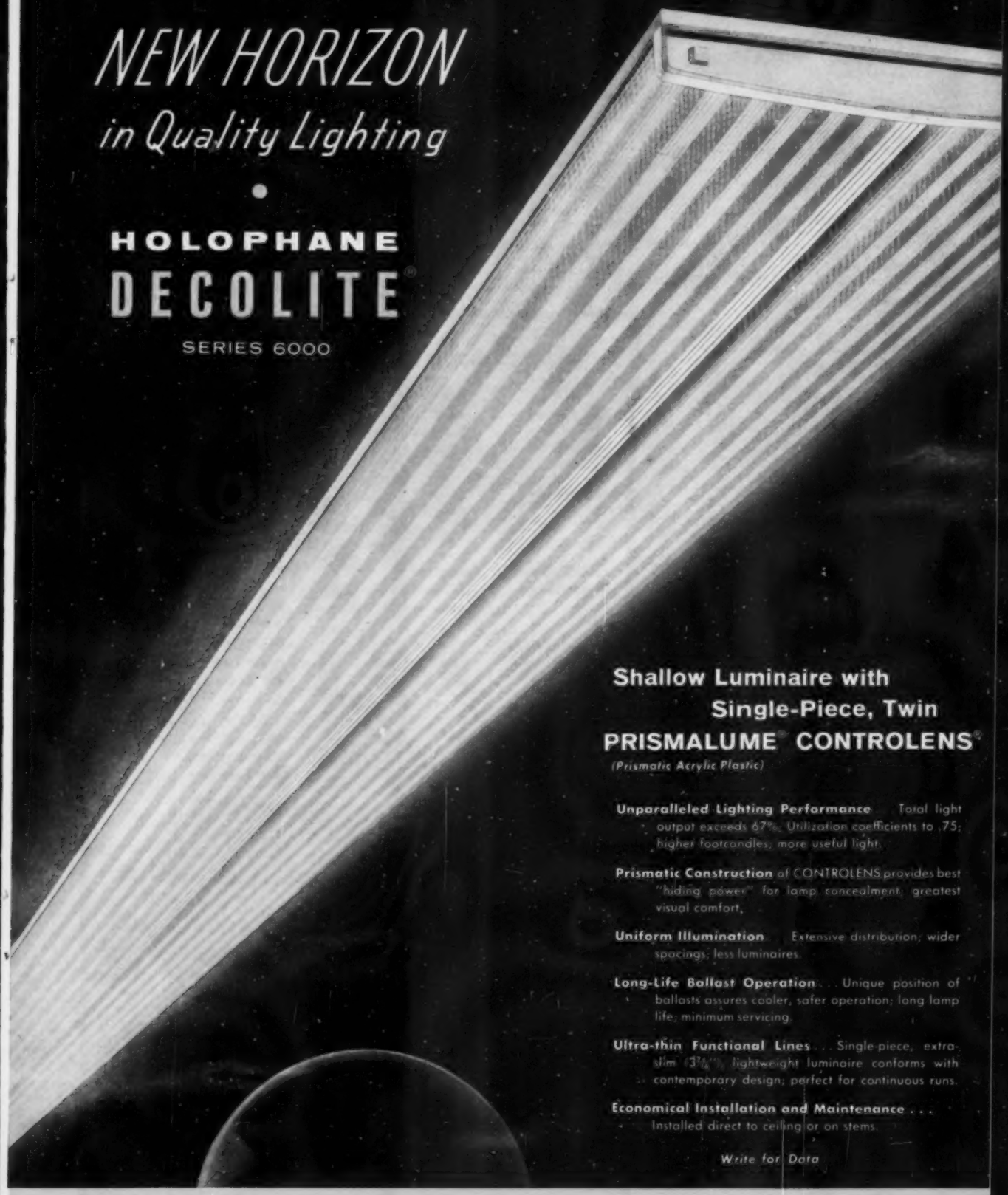
James E. Rust Electric Co., Inc.
1511 W. Jackson Blvd.
Chicago 7, Ill. — *Earl C. Heller*

(Continued on page 44A)

NEW HORIZON
in Quality Lighting

•

HOLOPHANE
DECOLITE®
SERIES 6000



Shallow Luminaire with Single-Piece, Twin PRISMALUME® CONTROLENS®
(Prismatic Acrylic Plastic)

Unparalleled Lighting Performance . . . Total light output exceeds 67%. Utilization coefficients to .75; higher footcandles; more useful light.

Prismatic Construction of CONTROLENS provides best "hiding power" for lamp concealment, greatest visual comfort.

Uniform Illumination . . . Extensive distribution; wider spacings; less luminaires.

Long-Life Ballast Operation . . . Unique position of ballasts assures cooler, safer operation; long lamp life; minimum servicing.

Ultra-thin Functional Lines . . . Single-piece, extra-slim (3¾") lightweight luminaire conforms with contemporary design; perfect for continuous runs.

Economical Installation and Maintenance . . . Installed direct to ceiling or on stems.

Write for Data

HOLOPHANE Company, Inc. *Lighting Authorities Since 1898*

342 Madison Avenue **New York 17, N. Y.**

When in New York—Visit **HOLOPHANE LIGHT & VISION INSTITUTE** *...Convenient: 342 Madison Ave. (at 44th St.)*

(Continued from page 42A)

Ryall Electric Supply Co.
2627 W. 6th Ave.
Denver 4, Colo. *C. O. Ryall*

S

Sachs Electric Corp.
P.O. Box 96, St. Louis 66, Mo. *Louis Sachs*

Safeway Stores, Inc.
Store Design Dept., 425 Madison St.
Oakland 4, Calif. *A. W. Anderson*

St. Joseph Light & Power Co.
520 Francis St.
St. Joseph 2, Mo. *F. P. O'Connor*

Salt River Project
P.O. Box 1980, Phoenix, Ariz. *S. S. Lambe*

Sandee Mfg. Co.
735 S. Karlov Ave.
Chicago 24, Ill. *James Clemens*

San Diego Gas & Electric Co.
P. O. Box 1831
San Diego 12, Calif. *H. G. Dillin*

Saskatchewan Power Corp.
1739 Cornwall St.
Regina, Sask. *W. B. Clipsham*

Savannah Electric & Power Co.
P.O. Box 949
Savannah, Ga. *James Averett*

Save Electric Corp.
615 Front St.
Toledo, Ohio *H. J. Howard*

O. V. Scott Electric Co.
641 Stewart Ave., S.W.
Atlanta, Ga. *O. V. Scott*

Albert Sechrist
499A Acoma St.
Denver, Colo. *Leonard J. Carlon*

Senior Fluorescent Inc.
70 4th St., N.W.
Atlanta, Ga. *W. C. Fink, Jr.*

Service Electric Co.
8345 South Ashland
Chicago, Ill. *Harold Zwitt*

Shalda Manufacturing Co. Inc.
Box 507
Burbank, Calif. *William Shalda*

Shamrock Electric Co., Inc.
1702 W. Foster Ave.
Chicago 40, Ill. *John T. O'Shea*

Shawinigan Water & Power Co.
600 Dorchester St. W.
Montreal, Que. *Charles H. Talbot*

The Sherwin-Williams Co.
101 Prospect Ave. N. W.
Cleveland 1, Ohio *J. A. Meacham*

Silvray Lighting, Inc.
R.K.O. Bldg., Radio City
New York 20, N. Y. *J. M. Gilbert*

The Simes Co., Inc.
114-15 15th Ave.
College Point, L. I., N. Y. *Gardner M. Simes*

Sinko Manufacturing & Tool Co.
7310 W. Wilson Ave.
Chicago 31, Ill. *Paul J. O'Connell*

Smithcraft Corp.
217 Everett Ave., Chelsea 50, Mass. *J. J. Smith*

Smoot-Holman Co.
P. O. Box 4097
Inglewood, Calif. *L. A. Hobbs*

Sola Electric Co.
Busse and Lunt Aves.
Elk Grove, Ill. *L. C. Marschall*

Solar Electric Corp.
Warren, Pa. *W. J. Dremann*

Solar Light Mfg. Co.
400 N. Ashland Ave.
Chicago 22, Ill. *Bernard Lazerson*

Solux Corp.
58-17 28th Ave.
Woodside 77, N. Y. *A. E. Spinetta*

Southern California Edison Co.
601 W. Fifth St.
Los Angeles 53, Calif. *Roy E. Dahlin*

Southern Canada Power Co. Ltd.
1450 City Councillors St.
Montreal, Que. *M. A. Perry*

Southern Colorado Power Co.
Box 75, Pueblo, Colo. *E. H. Pemberton*

Southern Indiana Gas & Electric Co.
P. O. Box 569
Evansville, Ind. *C. K. Graham*

Southern Lighting Mfg. Co.
501 Elwell St.
Orlando, Fla. *Dan Pohlar*

Southwestern Electric Power Co.
Box 1106, Shreveport, La. *E. F. Graham*

Southwestern Public Service Co.
P. O. Box 1261
Amarillo, Texas *Thomas Lynn*

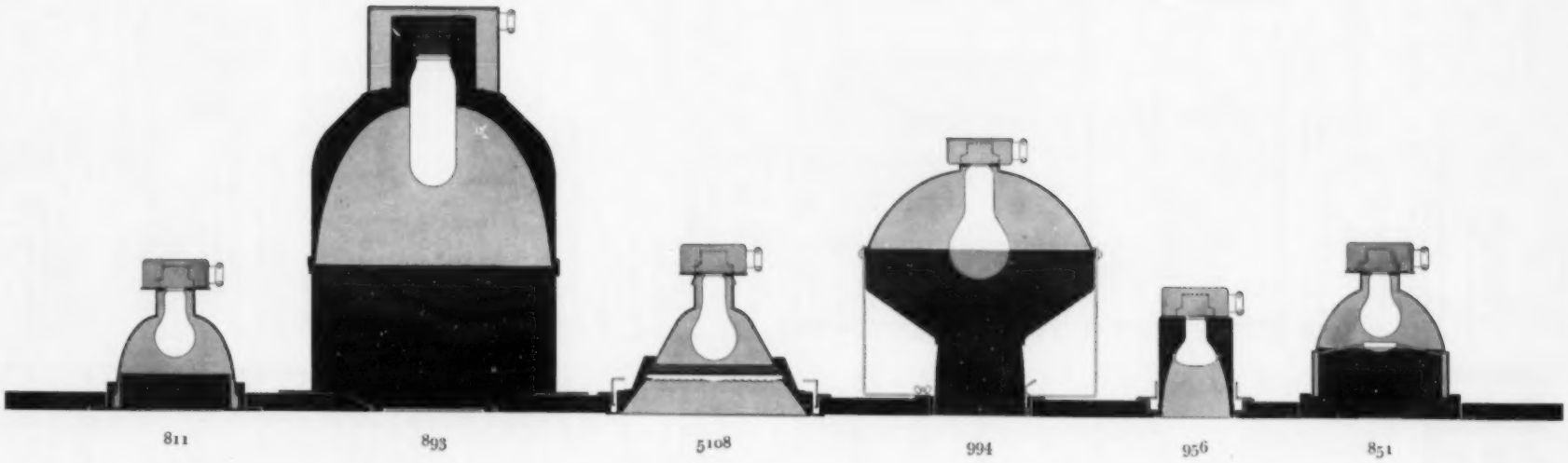
Spear Lighting Fixture Mfg. Co.
61 Clymer St., Brooklyn 11, N. Y. *Fred Kasher*

The Spero Electric Corp.
20500 St. Clair Ave.
Cleveland 17, Ohio *O. M. Spero*

(Continued on page 46A)

1961 IES Regional Conferences

Region	Date and Place	Chairman
East Central	April 10-11 Benjamin Franklin Hotel Philadelphia, Pa.	Ralph R. Enghouser Sylvania Electric Products 4700 Parkside Ave. Philadelphia, Pa.
Southwestern	April 17-18 Skirvin Hotel Oklahoma City, Okla.	Paul R. Sheline Paul R. Sheline Co. 1715 Linwood Blvd. Oklahoma City, Okla.
Southeastern/ South Central	April 20-21 Biltmore Hotel Atlanta, Ga.	Charles R. Minors Georgia Power Co. P. O. Box 1719 Atlanta, Ga.
Inter-Mountain	May 1-2 Salt Lake City, Utah	Donald Dyrenforth General Electric Co. 249 E. 5th South Salt Lake City, Utah Wayne F. Mulcock Utah Power & Light Co. P. O. Box 899 Salt Lake City, Utah
South Pacific Coast	May 4-5 Sacramento Inn Sacramento, Calif.	M. P. Fenton Smoot-Holman Co. 1331 T St. Sacramento, Calif.
Pacific Northwest	May 8-9 Harrison Hot Springs Harrison, B. C.	E. A. Adams Griffon Sales Ltd. 551 W. 8th Ave. Vancouver, B. C.
Canadian	May 15-16 Queen Elizabeth Hotel Montreal, Que.	J. P. Cristel Shawinigan Water & Power 600 Dorchester St. West Montreal, Que.
Northeastern	June 8-9 Berkeley-Carteret Hotel Asbury Park, N. J.	Bruce J. Jensen Public Service Electric & Gas Co. 80 Park Place Newark, N. J.
Great Lakes	June 19-20 Sheraton-Gibson Hotel Cincinnati, Ohio	H. K. Flint 2926 Debreck Ave. Cincinnati, Ohio



Shown here are cross-section drawings of six downlites designed and manufactured by Gotham Lighting. They are representative of some 680 units comprising the recessed downlite group. They are but one segment of more than 1050 different fluorescent and incandescent luminaires produced by Gotham Lighting. Each unit is the result of optical development and photometric testing. Each unit is engineered to specific requirements of lighting and construction. For comprehensive data on all Gotham Lighting equipment, with candlepower distribution curves, coefficients of utilization and efficiencies, as well as photographs, detailed drawings and specifications, a catalog is available on request. Gotham Lighting Corporation, 37-01 Thirty-first St., Long Island City, N. Y.

(Continued from page 44A)

Standard Electric Co.
P. O. Box 808
Pontiac, Mich. *Abe Cohen*

The Starbuck Sprague Co.
567 Watertown Ave.
Waterbury 20, Conn. *E. A. Madison*

Steel Craft Fluorescent & Stamping Co.
191 Murray St.
Newark 5, N. J. *Arthur Meister*

Sterling Electric Co.
44 South 12th St.
Minneapolis 13, Minn. *Fred Garling*

Sterling Reflector & Mfg. Co.
5249 West Grand Ave.
Chicago 51, Ill. *Anton Oberhuber*

Sticklor Electric Supply Co.
225 Walnut St.
Hartford 5, Conn. *Marshall Sticklor*

Stonco Electric Products Co.
333 Monroe Ave.
Kenilworth, N. J. *H. W. Spence*

Suburban Electric Co.
157 Pleasant St.
Malden, Mass. *Warren K. Lewellen*

Summit Electric Co.
1405 W. Diversey Parkway
Chicago, Ill. *W. S. Arbetter*

Sunbeam Lighting Co.
777 E. 14th Place
Los Angeles, Calif. *Herbert L. Krieger*

Sun-Ray Fluorescent Co.
2025 So. Michigan Ave.
Chicago 16, Ill. *Jerome Gimbel*

The Superior Electric Co.
83 Laurel St.
Bristol, Conn. *William P. Carpenter*

Supertest Petroleum Corp. Ltd.
543 Richmond St., London, Ont. *E. J. Lewicki*

Supreme Lighting Co.
600 Turner St.
Los Angeles 12, Calif. *Frank Blackwell*

Sylvania Electric (Canada) Ltd.
6233 Cote de Liesse Road
Montreal, Que. *F. W. Fulle*

Sylvania Electric Products Inc.
60 Boston St.
Salem, Mass. *W. P. Lowell, Jr.*

T

Tampa Electric Co.
P.O. Box 111
Tampa 1, Fla. *W. C. MacInnes*

Tarnow Electric Supply Co.
45 E. Milwaukee Ave.
Detroit, Mich. *Nathan Tarnow*

Frank C. Toal Co.
8222-24 E. Jefferson
Detroit 7, Mich. *Harold C. Smith*

Terreau-Racine Ltee.
196-228 St. Paul St.
Quebec, Que. *Georges Langlais*

Texas Electric Service Co.
Electric Bldg., Ft. Worth 1, Texas *O. G. Carlson*

Texas Power and Light Co.
P. O. Box 6331
Dallas 22, Texas *Bassett Watson*

Thompson Electric Co.
P. O. Box 875
Cleveland 22, Ohio *Robert K. Farrington*

Thompson-Wilson Co.
756 State St., N.W.
Atlanta, Ga. *H. L. Wilson*

Toledo Edison Co.
Edison Bldg., Toledo 4, Ohio *William R. Poole*

Toronto Hydro-Electric System
14 Carlton St.
Toronto 2, Ont. *Wilson J. Wylie*

B. M. Tower Co., Inc.
Dewey St., Bridgeport, Conn. *Harvey N. Tower*

Trans-Lite, Inc.
P. O. Box 70
Milford, Conn. *H. W. Jones, Jr.*

Tri-Part Mfg. Co.
359 S. Jessie St.
Pontiac, Mich. *Julius Reznik*

U

Union Electric Co.
315 N. 12th Blvd.
St. Louis 1, Mo. *J. E. Johanson*

Union Metal Mfg. Co.
Canton 5, Ohio *K. C. Dorland*

Unistrut Corp.
4118 Monroe Ave.
Wayne, Mich. *Hugo E. Rebentisch*

Unistrut Products Co.
933 Washington Blvd.
Chicago 7, Ill. *George W. Butler*

The United Illuminating Co.
80 Temple St.
New Haven 6, Conn. *E. B. Haskell*

Universal Lighting Products, Inc.
55 Bergenline Ave.
Westwood, N. J. *Elliott Kanarek*

Universal Mfg. Corp.
29-51 E. 6th St.
Paterson, N. J. *Imrich Miller*

Upper Midwest Chapter, N.E.C.A.
906 Foshay Tower
Minneapolis, Minn. *O. F. Norgren*

Utah Power & Light Co.
Box 899
Salt Lake City 10, Utah *D. H. White*

V

Vancouver Lighting Co. Ltd.
8650 Barnard St.
Vancouver 14, B. C. *Roy Holmes*

John C. Virden Co.
5209 Euclid Ave.
Cleveland 3, Ohio *R. W. Minett, Jr.*

John C. Virden Ltd.
19 Curity Ave.
Toronto 16, Ont. *Cyril E. Burt*

Virginia Electric & Power Co.
Richmond 9, Va. *W. I. Dosbeare*

Voigt Co.
1634-38 N. Carlisle St.
Philadelphia 21, Pa. *C. J. Frank*

Voltarc Tubes, Inc.
44 Cross St., Norwalk, Conn. *Miles Pennybacker*

W

Wadeford Electric Co.
205 W. Wacker Dr.
Chicago 6, Ill. *H. H. Lundberg*

The Wakefield Co.
Vermilion, Ohio *A. F. Wakefield*

Wald & Zigas
10 E. 39th St.
New York 16, N. Y. *Henry J. Wald*

F. J. Walsh Consulting Engineers
19 W. 34th St., New York, N. Y. *F. J. Walsh*

Warren Electric Co.
P. O. Box 2594
Houston, Texas *J. R. Thompson*

The Washington Water Power Co.
P. O. Drawer 1445
Spokane 6, Wash. *Gordon F. DeFoe*

Webb Electric Mfg. Co.
1701 S. W. Jefferson St.
Portland 1, Ore. *F. E. Webb*

The Welsbach Corp.
1500 Walnut St.
Philadelphia 2, Pa. *H. H. Adams*

Western Massachusetts Electric Co.
174 Brush Hill Ave.
West Springfield, Mass. *A. C. Brodeur, Jr.*

Westinghouse Electric Corp.
1216 W. 58th St.
Cleveland 2, Ohio *E. C. Huerkamp*

Westinghouse Electric Corp., Lamp Division
Bloomfield, N. J. *Marshall N. Waterman*

Westinghouse Electric Supply Co.
3 Gateway Center, P. O. Box 448
Pittsburgh 30, Pa. *Joseph W. Hartman*

West Penn Power Co.
Cabin Hill, Greensburg, Pa. *R. G. MacDonald*

Wheeler Reflector Co.
Div., Franklin Research & Development Corp.
Hanson, Mass. *Harlan B. Fletcher*

Wheeling Electric Co.
51 Sixteenth St.
Wheeling, W. Va. *M. J. Barth*

Dick White Lighting, Inc.
426 So. Third St.
Minneapolis 15, Minn. *Donald D. Olson*

White Way Electric Sign & Maintenance Co.
1317 Clybourn Ave.
Chicago 10, Ill. *Martin Davis*

Wholesale Electrical Supply Co.
7345-51 S. Cottage Grove Ave.
Chicago 19, Ill. *Raymond D. Arenberg*

Wide-Lite Corp.
P. O. Box 191
Houston 1, Texas *D. L. Calmes*

Wiedenbach-Brown Co. Inc.
111 Eighth Ave.
New York 11, N. Y. *W. C. Stockberger*

R & W Wiley Inc.
119 Dearborn St.
Buffalo 7, N. Y. *Robert C. Graves*

H. E. Williams Products Co.
109 S. Main St.
Carthage, Mo. *John E. Williams*

Wilmot Castle Co.
P. O. Box 629
Rochester 2, N. Y. *E. H. Greppin*

J. A. Wilson Lighting & Display Ltd.
280 Lakeshore Rd.
Toronto, Ont. *J. Carl Wilson*

The Windsor Utilities Commission
Hydro Division
149 Chatham St. W.
Windsor, Ont. *Henry R. Soutar*

The Wiremold Co.
Hartford 10, Conn. *Robert H. Murphy*

Wisconsin Electric Power Co.
Public Service Bldg.
Milwaukee 1, Wis. *G. W. Van Derzee*

Wisconsin Power & Light Co.
122 W. Washington Ave.
Madison 1, Wis. *M. R. Norton*

Wisconsin Public Service Corp.
Green Bay, Wis. *A. G. Bur*

Worcester County Electric Co.
939 Southbridge St.
Worcester 5, Mass. *Donald S. Bennett*

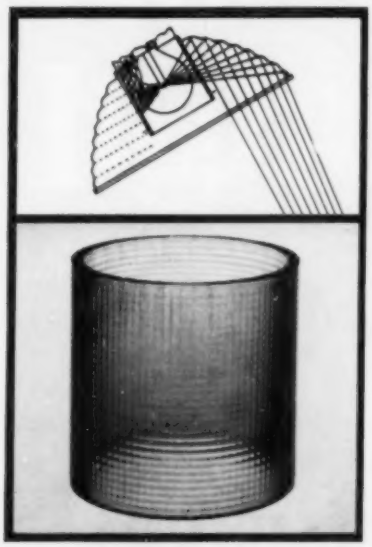
Work-O-Lite Co.
522 Cortlandt St.
Belleville, N. J. *Jack Siegel*

Z

Zenith Electric Supply Ltd.
185 Bridgeland Ave.
Toronto 10, Ont. *B. R. Steen*

Glass for lighting

CORNING'S ANSWERS TO A FEW LIGHTING PROBLEMS



NEW BLUE AKLO® CYLINDER ABSORBS 99+% OF IR

If there's ever a man you want to keep comfortable, it's a surgeon. So, you take extra pains with his lighting.

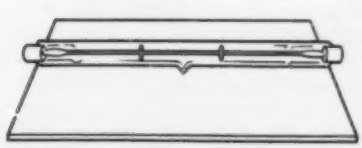
You want to correct his light to daylight. You want both him and his patient to stay as cool as possible.

A new AKLO filter which we make does both. It takes 2900°K light from incandescent lamps and corrects it to 4000°K. It absorbs all but a niggling less than 1% of the lamp's infrared, hardly enough to raise the temperature of a flea.

Add this to a cylinder that has been designed to be used with clear lamps and you get smooth, reproducible results every time the unit is re-lamped.

Filtering like this recommends itself for lighting, for photoengraving and photography, theaters, movies, television—in short, any place where you have light- and heat-conscious customers.

Check the coupon, if you're interested.



PROTECTING IODINE CYCLE LAMPS

All the recent interest in those radically new iodine cycle lamps has brought us a number of sticky problems. We've solved them.

We can now give you a glass lens that will sit for hours in an icy rain and then leap to 200°C when you light the lamp . . . without cracking or buckling.

The glass will also take untold weathering without wearing or discoloring, so you can assure customers of constant light down through the years.

We can work any special optical features you want into the glass. You can have it clear, diffused, or prismatic. You set the sizes and shapes and quantities.

Coupon.

HOW TO GET ONE FOR TWO ON KEROSENE CHIMNEYS

For years and years now we have provided two different chimneys for the railroad people to use with kerosene signals.

One looked like this.

It was for people who had springs that snapped on the lip of the chimney.

The other looked like this.

It was for people who had springs that snapped into indentations on the chimneys.

Sometimes the same people would use both, have to buy and stock both.

We came up with a design that looks like this.

As you can see, it can be used with both types of fixture. Now we make only one kind of chimney. The customers buy and stock only one kind. Everybody saves money. Everybody has fewer problems. That's progress.

We like simplifying things. We also like complexing things when it makes sense. We're flexible.

Try us either way when you have a lighting problem.

Start with the coupon, if you're interested in chimneys.

HOW CROUSE-HINDS DOLLED UP ITS EXPLOSION-PROOF FIXTURES

Nothing stimulates sales like having something new. When the thing that's new is also more useful, you've really got a winner.

Most people think this new Crouse-Hinds configurated globe *looks* better than its clear-glass predecessors. It also works better.

We helped.

The fluted pattern reduces glare and spreads the light more uniformly.

We put the flutes inside the globes, so there are no dust catchers. Cuts maintenance way down.

When you want something new to talk about, let us help you work over your lighting products.

CORNING MEANS RESEARCH IN GLASS

CORNING GLASS WORKS, 6103 Crystal Street, Corning, N.Y.

Please send information on:

- ☐ AKLO filters
- ☐ Iodine lamp lenses
- ☐ Kerosene chimneys
- ☐ Explosion-proof globes

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....

The nearsighted MISTER MAGOO says . . . "1956? A banner year! Princess Grace was married—unfortunately I couldn't attend—and General Electric invented the Power Groove Lamp. Happy birthday, Power Groo—Bowser! drop that salami! You've taken enough bites out of it already!"

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G-EXCLUSIVE! Power Groove® cuts your customers' initial costs as much as 40¢ a sq. ft.

General Electric Power Groove Lamps start saving your customers' money the day they're specified.

By any standard of comparison, they give more light—with fewer lamps—than any other fluorescent type or brand. If your customers are building or remodeling, Power Groove Lamps *can save them up to 40¢ per square foot of lighted floor area* right off the bat.

Just the beginning. With fewer lamps, fixtures and ballasts overhead, maintenance men spend less time on ladders.

Employees' increased efficiency helps pay for Power Groove Lamps. If every reject makes a customer wince, show him how improved lighting—at no extra cost—might spruce up his operation. Perhaps he can remove the individual lamps that light only machines or tables.

General Electric's 5-year-old secret is in the grooves. They bend a 9-ft. arc stream through an 8-ft. tube and swing it closer to the light-producing phosphor coating. No other fluorescent lamp compares with the Power Groove. Call your General Electric Lamp distributor for more details. General Electric Co., Large Lamp Dept. C-14, Nela Park, Cleveland 12, O.

Progress Is Our Most Important Product

GENERAL ELECTRIC

"America's finest fluorescent lighting"

Recessed Slendex solves tough ceiling problems . . . in low ceilings . . . in minimum cavities. Recessed only 1⅜" . . . so shallow it handles like tile. Surface-mounted Slendex is only 3" deep overall . . . ideal for low ceiling installations. Simplify your next project with Smithcraft Slendex. One foot wide for two lamps; two feet wide for four lamps.

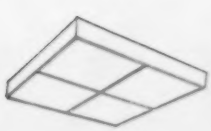
Slendex, as well as all Smithcraft fluorescent lighting equipment, may be leased under the Smithcraft LEASE-LIGHT* Plan to conserve capital while enjoying the benefits of good lighting.

Smithcraft Lighting CHELSEA 50, MASSACHUSETTS

Smithcraft Slendex

*Registered Mark Smithcraft Corporation

SPECIFY SMITHCRAFT UNITS FOR EVERY LIGHTING APPLICATION



OFFICES — Smithcraft LARGE ELEMENT Pre-assembled modular units for high-level, comfortable illumination of any area, in any pattern.

SCHOOLS — Smithcraft CHELSEA Tops them all for crisp, clean good looks, cool low brightness and fast, easy installation. More fixture for your money!

STORES — Smithcraft SONOLUME CEILING SYSTEM High-level illumination, plus effective sound absorption. Just 7" deep — adapts to any ceiling plan.

INDUSTRY — Smithcraft POWER-GROOVE INDUSTRIAL Up to 2½ times higher lighting levels at a lower cost per footcandle. PV series provides 25% uplighting.

How Sylvania's

Sylva-Flo Troffer with Multi-Vent®

gives you

- as much as 20% *more* light output
- longer ballast life
- true lamp color
- reduced maintenance and operating costs
- superior room air-conditioning

Sylvania's Sylva-Flo Troffer with Multi-Vent provides you with more than the convenience and economy of combining Lighting and Air Distribution in one efficient unit. It actually increases the quantity and improves the quality of the lighting system. Here's how . . .

Temperature affects the lighting efficiency of a fluorescent lamp. And the heat that builds up in a *conventional* troffer (or in a combination unit that isolates lamps from the air flow) reduces the light output of the lamps by as much as 20%. This heat build-up also has other effects. It shortens the life of the ballasts. It also affects the phosphors in the lamps, causing some variation from their designed color.

Now look at the illustration of Sylvania's Sylva-Flo Troffer using Pyle-National Company's Multi-Vent System of low-velocity air distribution. As the air passes through the fixture, it clings to the sides and flows out of the openings into the room area. As this air is directed through the fixture, the heat generated by the lamps is drawn into the air stream. The removal of this heat cools the lamp chamber.

The cooler temperature within the lamp chamber resulting from this heat removal . . .

. . . increases the light output of the fluorescent lamps as much as 20% (as compared to a troffer without air flow or to a combination unit with isolated lamp chamber) because the lamps are operating nearer their peak efficiency.

. . . adds appreciably to the life of the ballasts.

. . . permits the lamps to operate nearer their intended color.

In an installation where all fixtures handle air, as recommended, these benefits result from both the "supply" and "return" troffers.

In addition, the air passing through the "return" units prevents a large percentage of fixture heat from reaching the room area and minimizes dirt collection. In most installations, this lowers initial, operating and maintenance costs.

Sylvania's Sylva-Flo Troffer using the Multi-Vent System features a *coalescent* air stream which brings a continual, comfortable, gentle flow of *fresh*, conditioned air down into the occupied area. This low-velocity system provides many distinct advantages over other air distribution methods.

Because of these outstanding features, you should investigate Sylvania's Sylva-Flo Troffer with Multi-Vent fully before specifying. To obtain full detailed information, see your Sylvania representative or write for our new 20-page booklet.

SYLVANIA LIGHTING PRODUCTS
A Division of SYLVANIA ELECTRIC PRODUCTS INC.
One 48th Street, Wheeling, West Virginia

® Registered Trade Mark—The Pyle-National Co.

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

MONOTUBE POLES
in steel or aluminum

. . . engineering and styling to meet today's rigid outdoor lighting requirements

Business District Lighting

Highway Lighting

Residential Lighting

Area Lighting

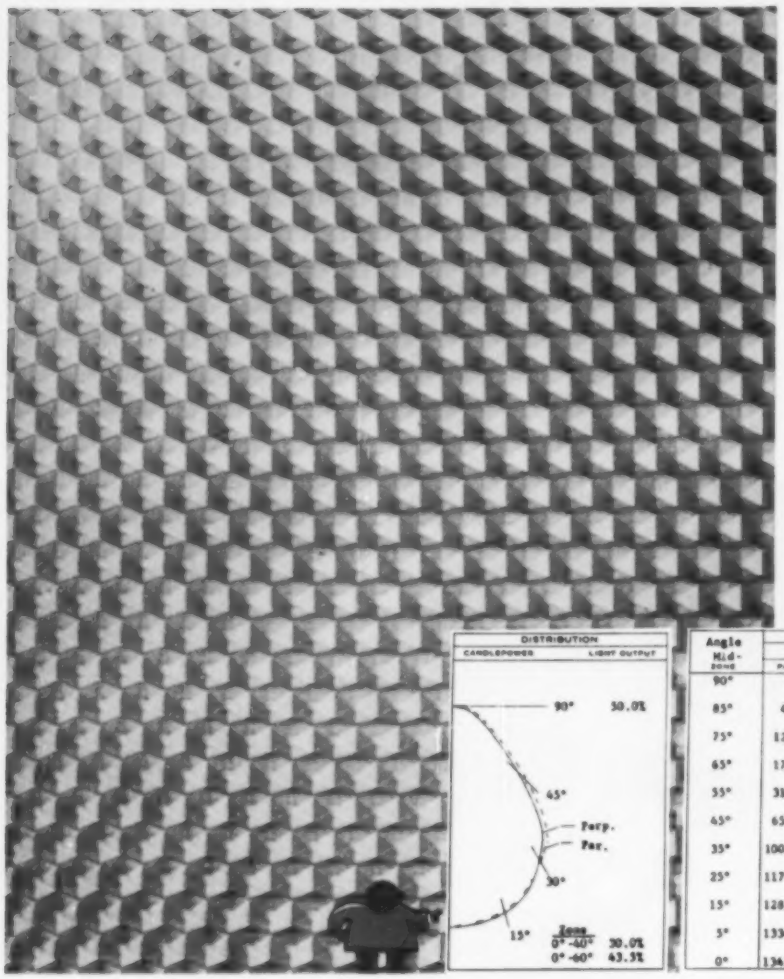
UNION METAL

THE UNION METAL MANUFACTURING COMPANY

Canton 5, Ohio Brampton, Ontario

Monotube Engineered Lighting Poles

announcing the New EXTRU-LITE® Pattern R-7

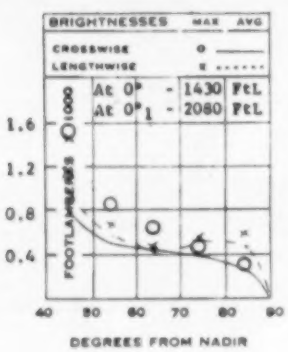


our famous plastic low brightness lensware — NOW extruded in a Brand NEW PATTERN.

Pattern R-7, with optically engineered hexagonal pyramids, permits the light to enter at all angles from the light source. It diffuses and refracts the light onto the work surface with a low brightness that is highly desirable for all types of visual tasks.

This 6-sided prismatic pattern controls, directs and reflects the rays to provide a glareless, more uniform light distribution.

Angle Mid-Zone	MID-ZONE CANDLEPOWER HORIZONTAL ANGLES PAR	60-0	45	67-0	PERP	LUMENS
90°	0		0		0	-
85°	60.2		60.2		25.3	60
75°	127		125		96.9	125
65°	176		200		179	188
55°	317		313		279	274
45°	653		620		556	472
35°	1003		1000		970	625
25°	1177		1198		1196	551
15°	1281		1293		1301	365
5°	1334		1335		1338	127
0°	1341		1341		1341	-



IMPORTANT! Superior Advantage of Pattern R-7 over other hexagonal shapes: The secret of positive light control is in the *raised prisms*—it's *outstanding* in more ways than one.

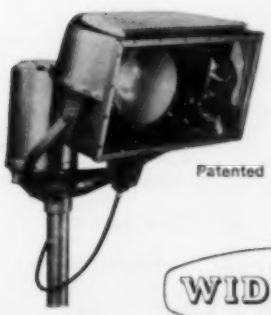
Available immediately from stock up to 24" wide in Polystyrene or Acrylic.

Write or call our Dept. BK at our factory or our Sales Offices listed below today for Sample of Extru-Lite R-7. It's tougher, safer, and lighter than other materials.

THE ROTUBA EXTRUDERS, INC.
A DIVISION OF WALJOHN PLASTICS, Inc.
MAKERS OF PLASTIC EXTRUSIONS FOR INDUSTRY
437 88th STREET, BROOKLYN 9, NEW YORK • SHORE ROAD 8-5458

Additional Offices: O'Connell & Associates, Chicago, Illinois, AMbassador 2-8841 | R. L. Bouse Co., Flourtown, Pa. (Phila.) CHestnut Hill 8-1010

a thriftier way to light an explosion-hazard area?



WIDE-LITE

HIGH EFFICIENCY FLOODLIGHTS

OUTDOOR AREA LIGHTS • VAPOR TITE MODELS • INDOOR WORK LIGHTS • MOBILE WORKING LIGHTS • SPORTS LIGHTS PROTECTIVE LIGHTS

In Canada: Wide-Lite Division, Wakefield Lighting, Limited, London, Canada

Take a processing plant that sprawls across a large area. Add the danger of explosion that even the greatest precautions can't completely eliminate when you're processing natural gasoline. It adds up to a lighting problem about as tough as they come.

The solution usually involves a large number of low efficiency explosion-proof lighting fixtures, and costly explosion-proof circuits and controls. But not in the gasoline processing plant operated by the Sun Oil Company at Laverne, Oklahoma. As you can see in the picture above, the engineers used imagination in the lighting layout.

They simply placed 1000-watt mercury vapor Wide-Lites on 50-foot poles on the perimeter of the plant area, out of reach of dangerous fumes. The plant was lighted just as you'd light a football field. The lights are on a 480-volt system, reducing cost of transformers and permitting the use of smaller cable. And of course the installation provided the well-known advantages of color-corrected mercury vapor Wide-Lites—low power consumption; smooth, even lighting, and low maintenance costs.

Find out how Wide-Lites can help you make the most of your creative lighting abilities—send the coupon today!

WIDE-LITE CORPORATION
P. O. Box 191 • Houston 1, Texas **Dept. Q111**

Please send more information on Wide-Lites. No obligation, of course.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

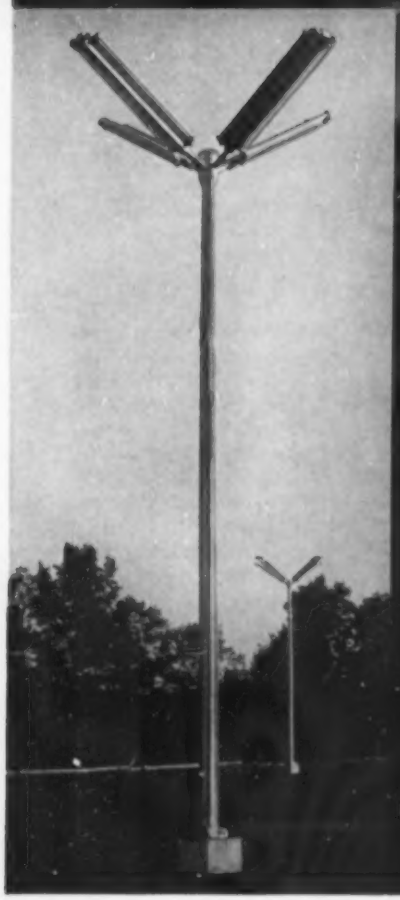
MODERN

IN MATERIAL,
IN STYLE,
IN LIGHTING
EFFECTIVENESS

P&K

"PACKAGED"
LIGHTING

aluminum standard
and LUXaire luminaire



FOR STREET LIGHTING

City of Holyoke, Mass. chose the P&K "packaged" LUXaire unit for their new street lighting installation, consisting of 30 foot mounting height tapered aluminum standards and 6 foot fluorescent 600 watt luminaires. "Best light source in the city" says City of Holyoke Gas & Electric Dept.

FOR AREA LIGHTING

King's Dept. Stores, Inc., Brockton, Mass. parking area gets all the light it needs to invite shoppers to park in safety. Distinctive P&K "Starburst" design minimized cost yet provided maximum illumination.

It's a fact, P&K lighting standards are modern in total concept: made of aluminum to provide light weight with strength ...styled in timeless good taste with a functional design that minimizes inventory of parts and speeds installation... and most important of all... P&K provides the complete "package" to assure the maximum of lighting effectiveness. And of course, handling standards and luminaires from one reliable manufacturer makes your job so much easier. For latest P&K catalog information, ask your P&K representative or write

PFAFF & KENDALL
84 Foundry Street
Newark 5, New Jersey
BRANCH SALES OFFICE: SAN JOSE, CALIF.
IN CANADA:
POWERLITE DEVICES, LTD.
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(Continued from page 32A)

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(*Continued on page* 56A)

Facts of Light!

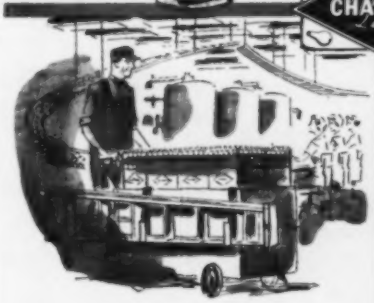
YOU CAN'T GET BOTH HIGH EFFICIENCY AND LONG LIFE IN INCANDESCENT LAMPS

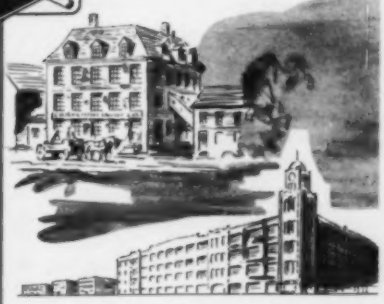
General service incandescent lamps are designed so that the ratio between life and efficiency (light output) results in lowest overall lighting cost for the average installation. When efficiency is increased, lamp life is shortened. When lamp life is extended, efficiency goes down

SOME PLANT AREAS "STEAL" LIGHT

Poor reflective surfaces drastically reduce the useful light you get from a lighting system. For instance, brick walls reflect only about 13% light. Smooth walls painted white, on the other hand, reflect 80-85% light.

CHAMPION Lamps





GROUP RELAMPING SAVES 17 MINUTES PER LAMP IN MAINTENANCE TIME

Maintenance studies show that it takes an average of 20 minutes to replace a single burned out lamp as against 3 minutes when lamps are group replaced.

SIXTY YEARS' EXPERIENCE GOES INTO CHAMPION LAMPS

Champion has been manufacturing incandescent lamps since 1900 and fluorescent lamps since their advent in 1938. Over 3,000 types and sizes are available.

Your Best Buy in Lamps

CHAMPION LAMP WORKS, Lynn, Massachusetts

CHAMPION INCANDESCENT-FLUORESCENT

12 ft. Super Speed-Line
Guaranteed to go up Twice as Fast or Garcy Pays the Extra Cost
Here's proof of labor savings on lighting. We say you can assemble and hang Speed-Line in 1½ man hours or less per 24 ft. of fixtures.
We not only say it. We'll guarantee it. In writing. If it takes longer, Garcy picks up the tab for the extra hours.
The guarantee covers all details of fixture assembly and wiring, stems, hanging, leveling and lamping. Only the pre-mounting of ceiling hickeys is excluded.
And this is top quality lighting! Efficient, well-shielded, low-brightness lighting that meets today's higher lighting standards for schools and offices.

(Continued from page 53A)

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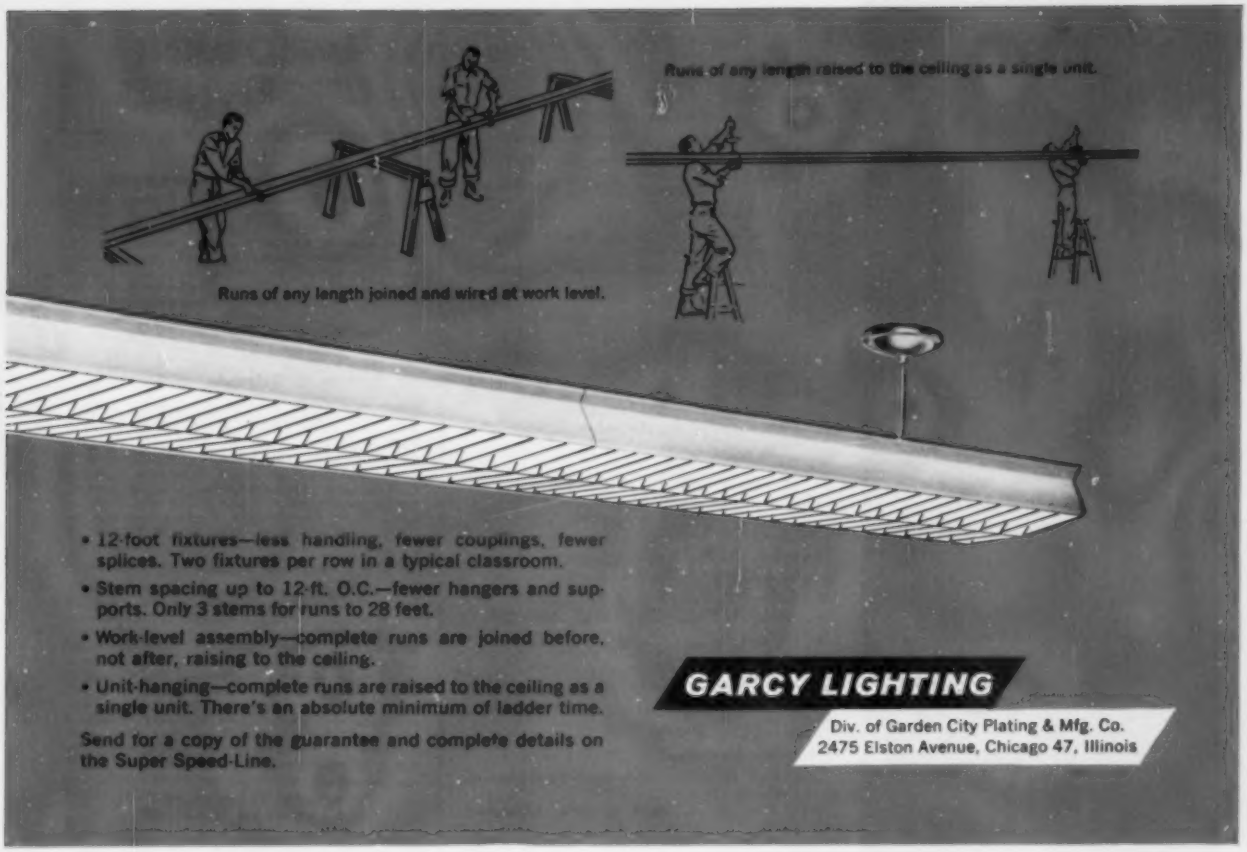
IES Emblem

The official IES Emblem is available to members in ½-inch, 14-karat gold, screw-back lapel pins at $3.75 each. Background of the emblem is blue for Members, red for Associate Members and white for Fellows. Orders for the lapel pins should be sent to John K. Michel, Membership Secretary, IES Headquarters, 1860 Broadway, New York 23, N. Y.


Runs of any length raised to the ceiling as a single unit.
Runs of any length joined and wired at work level.
• 12-foot fixtures—less handling, fewer couplings, fewer splices. Two fixtures per row in a typical classroom.
• Stem spacing up to 12-ft. O.C.—fewer hangers and supports. Only 3 stems for runs to 28 feet.
• Work-level assembly—complete runs are joined before, not after, raising to the ceiling.
• Unit-hanging—complete runs are raised to the ceiling as a single unit. There's an absolute minimum of ladder time.
Send for a copy of the guarantee and complete details on the Super Speed-Line.
GARCY LIGHTING
Div. of Garden City Plating & Mfg. Co.
2475 Elston Avenue, Chicago 47, Illinois

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No Elections

SOUTHEASTERN REGION

CENTRAL FLORIDA CHAPTER

No Elections

(*Continued on page* 58A)

Precision automated lighting

cuts cost
accidents
security risks

One user bought two Precision controls for $35 — saves 3000 watt hours of power monthly. Other users cut pilferage and accidents to zero.

Installed in minutes, field-proven Precision photocontrol turns lights **on at sunset — off at sunrise** automatically. Needs no maintenance, pays for itself because lights are on only when needed.

Write — wire for details.

PRECISION
MULTIPLE CONTROLS, INC.
Ridgewood, New Jersey, U.S.A.

The difference between night and day

(Continued from page 57A)

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No Elections

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No Elections

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No Elections

EMPLOYMENT OPPORTUNITIES

REPRESENTATIVE WANTED

By expanding leading western lighting manufacturer. Some territories available in South, East and Midwest. Excellent opportunity for right man to represent highest quality specification grade fluorescent and incandescent products, as well as custom. Must have experience in selling lighting, particularly at the specification level. Reply in strictest confidence to . . .

SECHRIST MFG. COMPANY
c/o V.P. Sales
Box 6775
Denver 16, Colorado

POSITION WANTED

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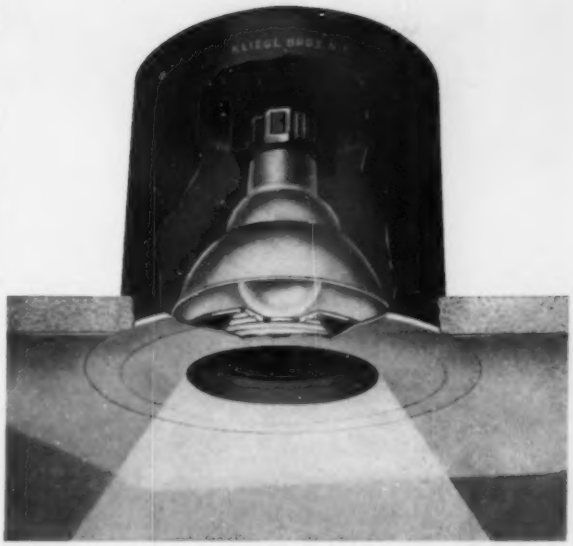

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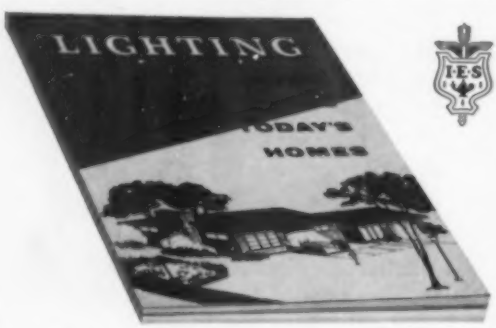

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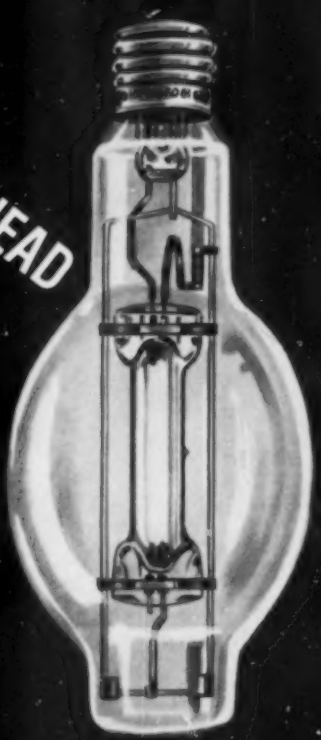

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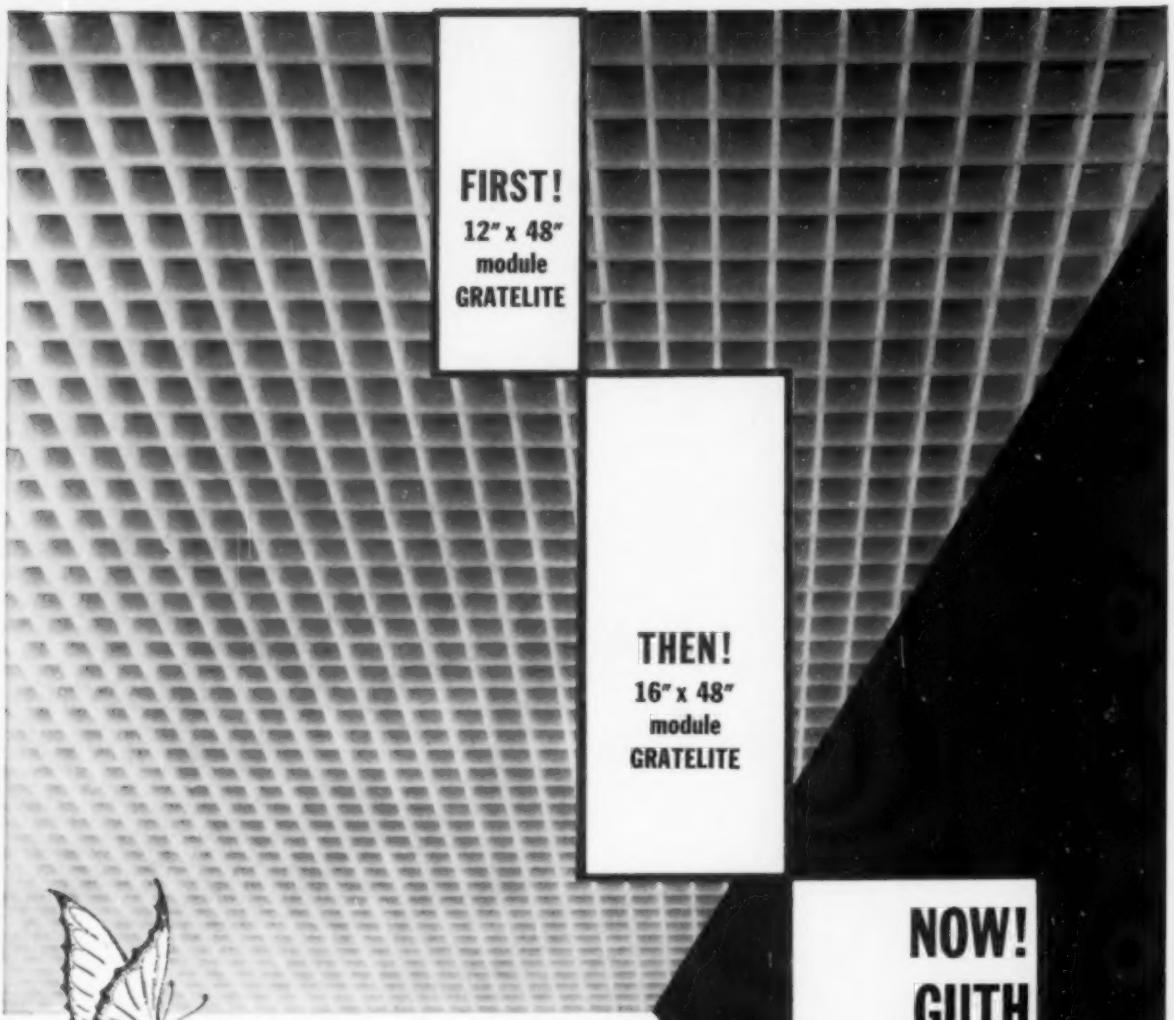

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